FINAL

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
U.S. ARMY GARRISON, FORT GORDON
FORT GORDON, GEORGIA

September 2008

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Final

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UNITED STATES ARMY GARRISON, FORT GORDON FORT GORDON, GEORGIA

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Fort Gordon, Georgia

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September 2008

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (2009 THROUGH 2013)

FORT GORDON, GEORGIA

APPROVAL

This Integrated Natural Resources Management Plan has been prepared pursuant to the Sikes Act (16 U.S.C. 670a *et seq.*) as amended. The signatures below indicate the mutual agreement of the parties concerning the conservation, protection, and management of fish and wildlife resources as presented in the Plan.

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EXECUTIVE SUMMARY

ES.1 Type of Document

This is an Integrated Natural Resources Management Plan.

ES.2 Purpose of Document

The purpose of this document is to meet statutory requirements under the Sikes Act Improvement Amendment, Public Law 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022. In November 1997, the Sikes Act, 16 U.S.C. § 670a *et seq*., was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement Integrated Natural Resources Management Plans (INRMP) for each military installation in the United States (U.S.) unless the absence of significant natural resources on a particular installation makes preparation of a plan for the installation inappropriate. The U.S. Army Garrison, Fort Gordon (Fort Gordon) has prepared this INRMP for all lands managed by Fort Gordon.

ES.3 Goals and Objectives of the INRMP

The goal of the INRMP is to implement an ecosystem-based conservation program that provides for conservation and rehabilitation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources; provides for sustainable multipurpose uses of natural resources; and provides public access for use of natural resources subject to safety and military security considerations. The INRMP covers a period of 5 years. Fort Gordon has identified seven broad goals with multiple objectives within each of the program element action plans.

Goal 1: Identify and maintain or restore native ecosystem types (*i.e.*, longleaf pine [(*Pinus palustris*)] and associated ecosystems) across their range of variation within natural managed areas of Fort Gordon.

Goal 2: Manage natural resources to maintain or restore essential ecological processes integral to species interactions and ecosystem resiliency on the installation.

Goal 3: Manage large areas over sufficiently long time periods to allow biological evolution and changing system dynamics on Fort Gordon.

Goal 4: Represent, maintain, or reestablish viable populations and genetic diversity of target species, especially rare or endemic species, in existing managed natural areas.

Goal 5: Monitor target species, communities and sites; and conduct research to guide management and identify progress toward goals as part of the adaptive management process at Fort Gordon.

Goal 6: Build public and private understanding and support for the preservation of natural areas.

Goal 7: Conduct all management activities in compliance with all local, state, and applicable Federal laws, regulations and standards.

ES.4 Projects of the INRMP

Projects are discrete actions for fulfilling a particular strategy. Projects may be required in order for Fort Gordon to fulfill regulatory requirements regarding natural resources management, or to enhance existing measures for ensuring compliance. A general summary of the major actions\projects during the next 5 years and the programs they support can be seen in Table ES-1. Actions that are tied together that will take several years to implement are color coded. For example, timber harvest in Fiscal Year (FY) 2008 will support RCW translocation in FY 2009 and FY 2010. Annual work plans to be developed for each FY will include a listing of projects, funding requirements, common levels of service (CLS) supported, and manpower data to complete the action. This work plan will be used to track progress on INRMP implementation, budget expenses, request budget allotments for future months and

coordinate needed manpower requirements for labor intensive projects.

Table ES-1. Projects to be Implemented During Fiscal Years 2009 through 2014 in Support of the INRMP

Fiscal Year	Location	Management Action	Project	Program Element Support
2008	Training Areas 18, 26, and 27	Timber Harvest	RCW Habitat	ESMC
	Training Areas 3 and 4	Timber Harvest	GA Power Powerline	RPMP
	Training Areas 48	Timber Harvest	Forest Management	FORESTRY
	Training Areas 14, 17, 19, 20, 22, 26, 30, 37A, 37B, 45, 46, 47, 48, 49B, and SAIA D	Prescribed Burn	Ecosystem Management	INRMP
	Ranges and AIA	Prescribed Burn	Training Support	RCMP
2009	Training Areas 18,26, and 27	RCW Translocation	RCW Managment	ESMC
	Training Area 23	Timber Harvest	Drop Zone Expansion	RCMP
	3 and 4	Timber Harvest	Forest Management	FORESTRY
	Training Areas 21, 22, and 23	Timber Harvest	RCW Habitat	ESMC
	Annual updates will determine areas	Prescribed Burn	Ecosystem Management	INRMP
	Ranges and AIA	Prescribed Burn	Training Support	RCMP
	Bldg 14600	Annual Review	Natural Resources	INRMP
2010	Training Areas 26 and 27	RCW Translocation	RCW Management	ESMC
	Training Areas 14, 15, 16, 19, and 20	Timber Harvest	RCW Habitat	ESMC
	Training Area 46	Timber Harvest	MPMG Range	RCMP
	Annual updates will determine areas	Prescribed Burn	Ecosystem Management	INRMP
	Ranges and AIA	Prescribed Burn	Training Support	RCMP
	Bldg 14600	Annual Review	Natural Resources	INRMP
2011	Training Areas 21,22, and 23	RCW Translocation	RCW Management	ESMC
	Training Areas 24, 25, 30, and 31	Timber Harvest	RCW Habitat	ESMC

Table ES-1, continued

Fiscal Year	Location	Management Action	Project	Program Element Support
	28 and 29	Timber Harvest	Forest Management	FORESTRY
	Annual updates will determine areas	Prescribed Burn	Ecosystem Management	INRMP
	Bldg 14600	Annual Review	Natural Resources	INRMP
2012	Training Areas 19 and 20	RCW Translocation	RCW Management	ESMC
	Training Areas 33 and 36	Timber Harvest	RCW Habitat	ESMC
	Training Areas 34, 35, and 49	Timber Harvest	Forest Management	FORESTRY
	Annual updates will determine areas	Prescribed Burn	Ecosystem Management	INRMP
	Ranges and AIA	Prescribed Burn	Training Support	RCMP
	Bldg 14600	Annual Review	Natural Resources	INRMP
2013	Training Areas 14, 15, and 16	RCW Translocation	RCW Management	ESMC
	Training Areas 37, 38, 39, 40, 41, and 42	Timber Harvest	Forest Management	FORESTRY
	Annual updates will determine areas	Prescribed Burn	Ecosystem Management	INRMP
	Ranges and AIA	Prescribed Burn	Training Support	RCMP
	Bldg 14600	Annual Review	Natural Resources	INRMP
2014	Training Areas 24, 25, 30,and& 31	RCW Translocation	RCW Management	ESMC
	Training Areas 43, 44, 45, 46, and 47	Timber Harvest	Forest Management	FORESTRY

Source: Fort Gordon 2008

Footnote: Actions that are interrelated are color coded and will take several years to implement
ESMC Endangered Species Management Component
RCMP Range Complex Master Plan
RPMP Real Property Master Plan

Funding for implementation of the INRMP, other than forest management, will come from U.S. Army Installation Management Command (IMCOM) and Army Environmental Center (AEC). A summary of funding required for implementation of all projects is presented in Table ES-2. The level of implementation will be based on the amount of funding received by the installation. The natural resources programs and projects described in this INRMP are divided into mandatory and stewardship categories to reflect implementation priorities. Funding will be acquired to implement

Department of Defense (DoD) mandatory projects in the timeliest manner possible. Stewardship projects will be funded through forestry revenues, DoD Forestry Reserve Account, U.S. Army 21X5095 account, Legacy Funds or other fund sources.

Table ES-2. Estimated Environmental Program Requirements (in dollars) Fiscal Years 2009 through 2013

Project	FY09	FY10	FY11	FY12	FY13	TOTAL
Salaries Natural Resources not included Elsewhere	150,000	155,000	160,000	165,000	170,000	**800,000**
Implement Endangered Species Conservation Requirements	439,000	450,000	465,000	480,000	495,000	**2,329,000**
Implement Fish and Wildlife Management Plan (Sikes Act Funds)	43,000	43,000	44,000	44,000	45,000	**219,000**
Implement Integrated Natural Resources Management Plan	328,000	335,000	350,000	360,000	370,000	**1,743,000**
Review/Update INRMP and prepare NEPA	5,000	5,000	5,500	5,500	50,000	**71,000**
Conservation Supplies and Materials	23,500	25,000	26,000	27,000	28,000	**129,500**
Conduct Invasive Species and Pest Management	22,500	23,000	24,000	25,000	26,000	**120,500**
GIS data, Supplies and Materials *includes new aerial photos	13,000	103,000*	14,000	14,000	107,000*	**251,000**
Ecosystem Management and Monitoring	220,000	225,000	230,000	240,000	250,000	**1,165,000**
Training & Certification Requirements	8,000	8,500	9,000	9,500	10,000	**45,000**
Total	**1,252,000**	**1,372,500**	**1,327,500**	**1,370,000**	**1,551,000**	**6,873,000**

Source: Fort Gordon, 2008

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1.0 OVERVIEW

1.1 PURPOSE

The purpose of this plan is to integrate individual natural resources management programs at the United States (U.S.) Army Garrison, Fort Gordon (Fort Gordon) military installation with other land uses or affecting activities, which assures good stewardship of Department of Defense (DoD) lands and complies with all Federal laws and regulations while supporting the military mission. The plan is designed to provide necessary guidance for the orderly, economical maintenance of the lands and natural resources contained within the military installation at Fort Gordon. The plan provides documentation for enhancing and restoring ecosystem integrity and biodiversity, as well as the utilization of water resources, forest, fish and wildlife resources, while allowing multiple-use of installation lands.

This 5-year update of the Fort Gordon Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the Department of the Army's INRMP template (14 August 2006). Section 1 provides a general overview of the purpose and intent of the INRMP, a description of the military mission and the processes for review, implementation and revisions to the plan. Section 2 describes the current conditions and uses, including the general physical and biotic environment. Section 3 discusses the environmental management strategy and mission sustainability, and Section 4 outlines the ecosystem management elements and relates them to the goals, objectives, strategies, initiatives, and projects. Section 5 describes the INRMP implementation including cooperative agreements and funding. A list of acronyms and abbreviations used in the INRMP is provided as Appendix A. Appendix B provides a list of references used in the preparation of this INRMP.

1.2 SCOPE

The scope of the INRMP includes all lands managed by Fort Gordon (Figure 1-1). Fort Gordon is operated under the jurisdiction of the U.S. Army Installation Management Command (IMCOM). The U.S. Army Training and Doctrine Command (TRADOC) is the senior tenant and mission commander at the installation. The plan also has a dual purpose of complying with various natural resources related laws while supporting the military mission of Fort Gordon.

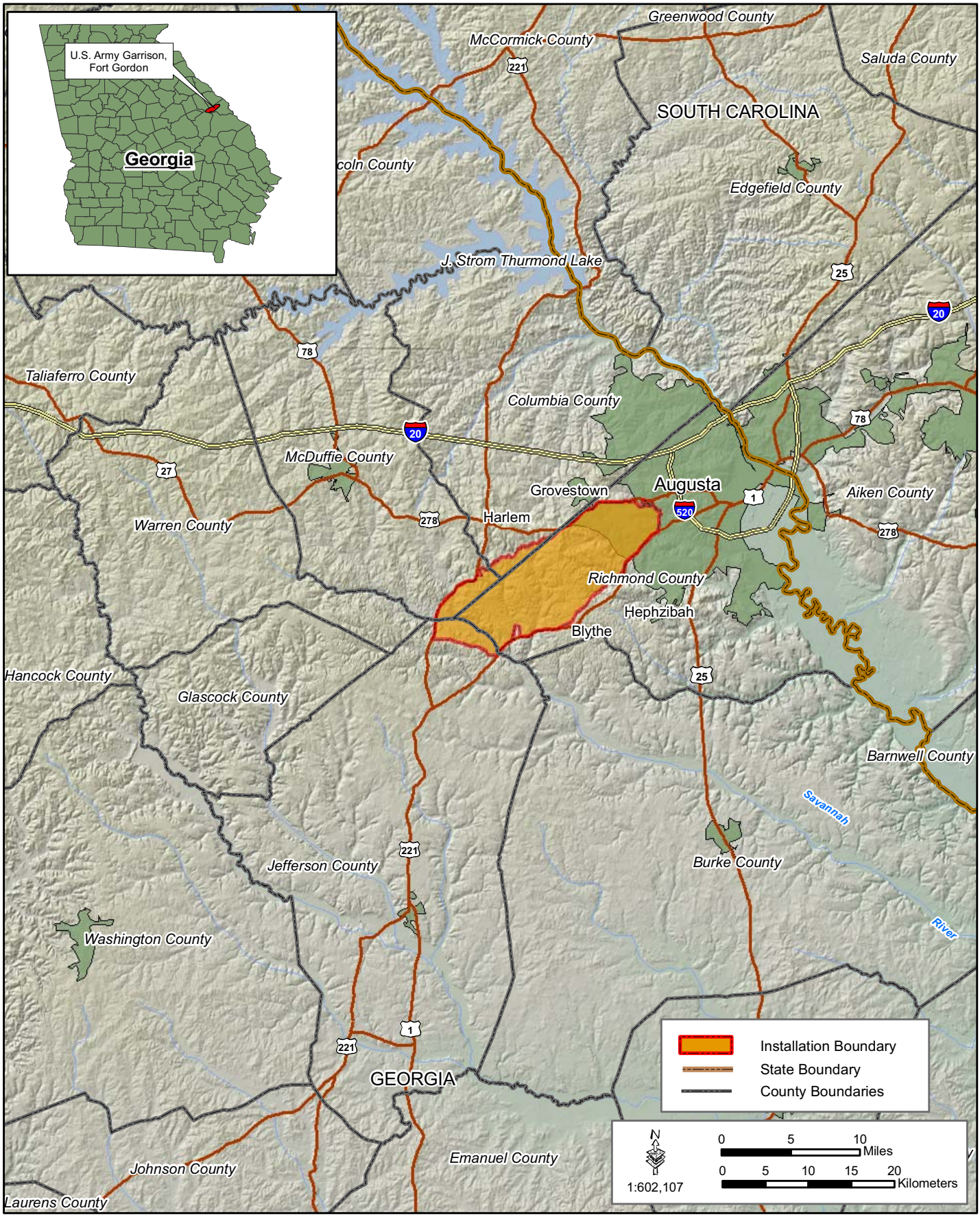

Figure 1-1: Fort Gordon Location Map

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1.3 GOALS AND OBJECTIVES

Fort Gordon's identification and prioritization of current and future projects are guided by a number of interrelated items including a vision statement, a mission statement, issues, goals, objectives, and desired future ecosystem processes.

Fort Gordon's approach to natural resources management is captured in the installation's vision of the relationship between its military mission and the natural resources upon which that mission depends. The installation also has developed a natural resources management mission statement that provides an overarching premise for how Fort Gordon will manage its lands.

1.3.1 Fort Gordon Natural Resources Management Vision Statement

Support the soldier and Fort Gordon's military mission while promoting the ecological integrity of the Fort Gordon landscape.

1.3.2 Fort Gordon Natural Resources Management Mission Statement

Through a collaborative effort between military personnel and natural resources professionals, Fort Gordon will promote the long-term ecological sustainability of its lands for military training and multiple-use opportunities. Fort Gordon will apply sound land management practices and adaptive management strategies that conserve ecological integrity through the restoration, maintenance, and conservation of natural biotic communities. This ecosystem management approach will encompass stakeholder interests, regulatory requirements, and fiscal constraints.

1.3.3 Goals and Objectives

The management goals define the broad, overall natural and cultural resources management direction for Fort Gordon. In the context of this plan, goals are defined as the general target or end result desired to be achieved through integrated resource management. Objectives are defined as more specific targets of which attainment will contribute to the accomplishment of management goals. Goals and objectives will be adjusted over time using an adaptive management approach and as Fort Gordon's military mission and ecological condition change. Fort Gordon has identified seven broad goals with multiple objectives within each of the program element action plans. The following are the goals of Fort Gordon's ecosystem-based management approach.

Goal 1: Ecosystem Composition and Structure - Identify and maintain or restore native ecosystem types (i.e., longleaf pine [(Pinus palustris)] and associated ecosystems) across their range of variation within managed natural areas of Fort Gordon.

Identifying, mapping, and assessing the quality of natural communities on Fort Gordon will advance the goals of this plan by distinguishing managed natural areas from areas suitable for training and multiple-use management activities. Guidelines will subsequently be developed for appropriate activities within areas of different quality.

Goal 2: Ecosystem Processes - Manage natural resources to maintain or restore essential ecological processes integral to species interactions and ecosystem resiliency on the installation.

Two major abiotic processes, fire and hydrology, shape the natural communities found on Fort Gordon. Restoring these processes to more natural states will benefit native species. Fire management includes prescribed burns, wildfire suppression and a long-term multi-scale monitoring plan. Fire management maintains biodiversity, reduces fuel, and protects property from wildfire. Restoring and preserving natural hydrologic processes involves minimizing damming and upland erosion. Abating threats to natural hydrologic processes will maintain and protect aquatic species.

Goal 3: Landscape Dynamics (Time and Space) - Manage large areas over sufficiently long time periods to allow biological evolution and changing system dynamics on Fort Gordon.

To ensure the persistence of all levels of biodiversity on Fort Gordon including gene flow, species, populations and communities, landscapes should be managed with ecological time frames in mind. A landscape approach to biodiversity conservation focuses on protecting interactions among ecosystems across large land areas (Leslie *et al.*, 1996). Management strategies under this goal target preserving and restoring connectivity and managing for a vegetation mosaic. The goal focuses primarily on the dominant and more regionally endangered uplands of Fort Gordon and to a lesser degree on the wetlands.

Maintenance and restoration of intact longleaf pine forests with associated native groundcover is the major component of this goal.

Currently, loblolly pine (*Pinus taeda*) and slash pine (*Pinus elliottii*) dominate large areas across Fort Gordon. These areas result from fire suppression and past logging practices followed by planting or natural reseeding of these species. In the long-term, restoring longleaf pine and associated native groundcover on most suitable soils will reduce fragmentation and provide vegetation to fuel prescribed burns across large management units. Restoring longleaf pine and lengthening rotations will also result in more mixed-age stands than are present in many areas, especially on the droughty, nutrient-poor soils that are prevalent on the installation.

Goal 4: Target Species - Represent, maintain, or reestablish viable populations and genetic diversity of target species, especially rare or endemic species, in existing managed natural areas.

Most of the management strategies in the INRMP focus on restoring or maintaining the habitat or natural communities in which target species live. This broad scale approach is both economically and ecologically reasonable. However, for some target species, shorter term or more intensive management efforts will be required to guarantee their persistence or reintroduction across the installation. Strategies in this goal address specific and short-term needs for securing population success on the installation.

Fort Gordon is home to about 20 target species with some level of Federal and/or state designation. Installation management priorities for these target species will be based upon a combination of threat, urgency, and current population statistics. Setting priorities for limited single species management will help allocate staff and financial resources.

Goal 5: Monitoring and Research Program - Monitor target species, communities and sites, and conduct research to guide management and identify progress toward goals as part of the adaptive management process at Fort Gordon.

To measure the success of the management strategies and activities proposed in this plan, a scientific monitoring program will be required. The primary objective of the monitoring program is to repeatedly measure specific variables to detect changes in the status of species, communities and sites over time. Monitoring documents trends and allows assessment and development of new management strategies to respond to threats to native populations and natural communities. Monitoring also increases the biological

understanding of target species, which is lacking for most species, with the exception of the red-cockaded woodpecker (*Picoides borealis*, RCW) and gopher tortoise (*Gopherus polyphemus*). For a more specific understanding of species and their habitat, research may be needed. Through scientific research, certain information can be obtained for management. Understanding what factors make some taxa vulnerable to extinction is an important step in protecting them and facilitating their recovery.

Goal 6: Public Outreach and Agency Relations - Build public and private understanding and support for the preservation of natural areas.

Developing relationships with the public and other agencies benefits the natural resources management program on Fort Gordon. Public outreach informs the public of the military mission and provides an avenue to avoid conflict between the military mission and the public's needs outside of the installation. Federal and state agencies provide technical support through the review of the INRMP and other natural resources management plans.

Goal 7: Legal and Regulatory Requirements - Conduct all management activities in compliance with all local, state, and applicable Federal laws, regulations and standards.

As stewards of land held in the public trust, resource managers must conduct all management activities within a multi-level legal framework. Compliance with Federal, state, and local laws, as well as, U.S. Army, TRADOC, and installation regulations is required.

1.4 RESPONSIBILITIES

1.4.1 Installation Stakeholders

The U.S. Army Garrison, Fort Gordon, is directly responsible for operations and maintenance of Fort Gordon, including the implementation and enforcement of the INRMP. This involves the cooperation of many different organizations both on Fort Gordon, as well as many outside agencies. An organizational chart of installation stakeholders responsible for implementation of the INRMP is presented in Figure 1-2.

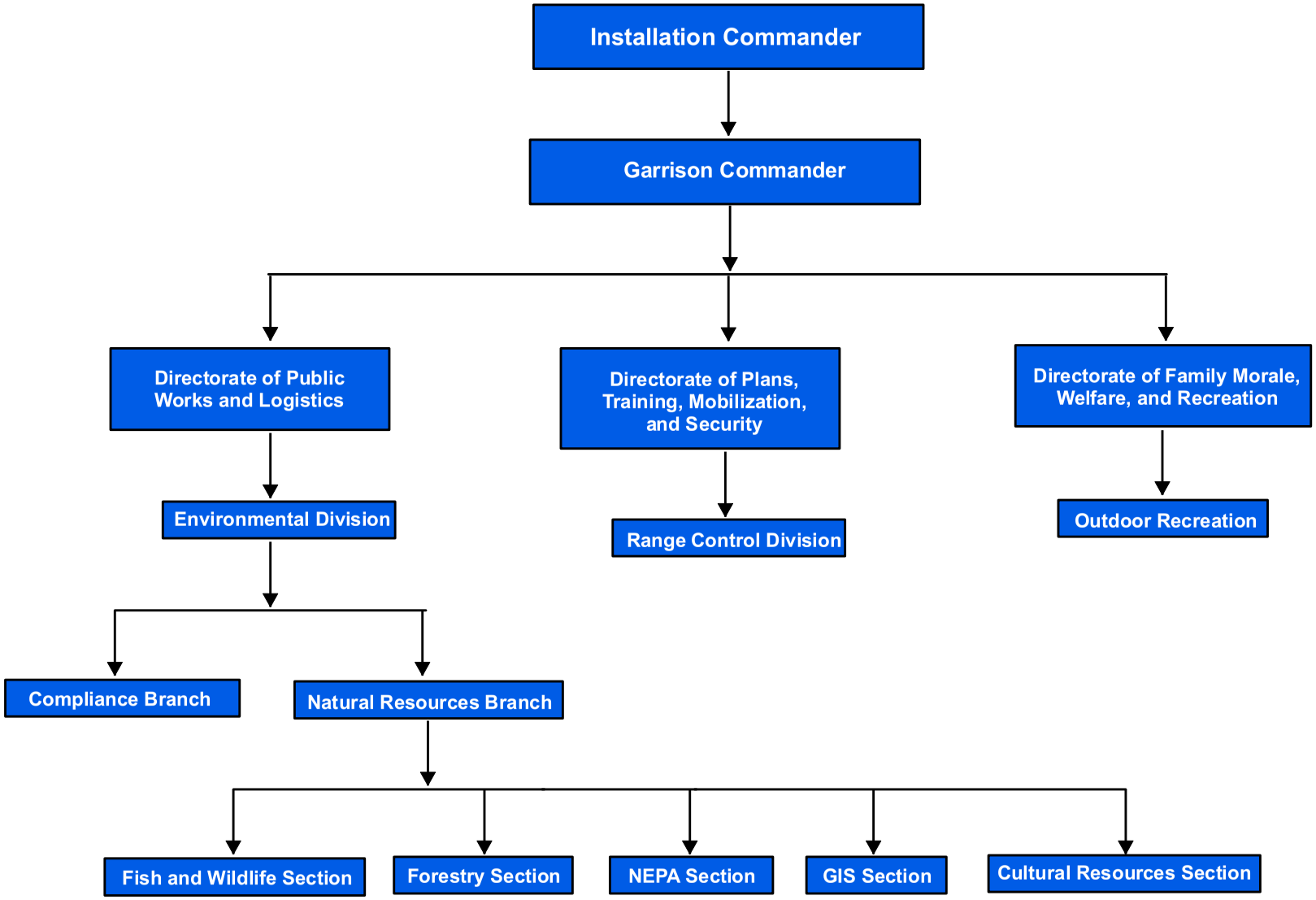

Figure 1-2: Organization of Installation Stakeholders Responsible for Implementing the INRMP

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1.4.1.1 Installation Commander

The installation Commander and other personnel in command positions at Fort Gordon fully support this INRMP. The command is dedicated to ensuring the long-term sustainability of the natural resources and the management of those resources necessary to support the military mission.

The installation Commander should lead in environmental stewardship by ensuring that personnel at all levels are fully engaged in the daily activities necessary for protection and enhancement of natural resources. To ensure top-down implementation of this INRMP, the command should project that natural resources protection is a vital part of mission implementation. Leadership should impress upon all personnel the importance of each individual taking responsibility for his or her role in carrying out the provisions of the INRMP. To put the need for appropriately managing natural resources into perspective, the command should emphasize that natural resources protection is just as important as other mission fundamentals. General Dennis J. Reimer, former Chief of Staff, Army, said it best, "Environmental responsibility involves all of us. The environmental ethic must be part of how we live and how we train. By working as a team we can preserve both the natural diversity of military training areas and our opportunity to train the way we plan to fight now and in the future." The command should hold each responsible individual accountable for actions required by this INRMP and other applicable environmental requirements by use of the established disciplinary system.

The installation Commander should require integration of natural resources stewardship early in the planning process. Proponents of projects or training should coordinate with the appropriate environmental staff in sufficient time to incorporate any input or make any necessary changes to the planned activity. This can be accomplished by inviting environmental specialists to participate in project planning meetings and submitting requests for environmental evaluations early in the process.

Implementation efforts must be realistically evaluated and revised as needed. The installation Commander has various committees tasked with duties that will assist with implementation of the INRMP, such as the Environmental Quality Control Council, Staff Assistance Visit, and specially designated Process Action Teams. Annual review processes; such as the installation Status Review; Environmental Compliance and Assessment; Environmental Quality Report; the annual Endangered Species Report to TRADOC; and

the annual RCW status report to U.S. Fish and Wildlife Service (USFWS) and DoD are all mechanisms to monitor the success of INRMP implementation.

1.4.1.2 Garrison Commander

The Garrison Commander is responsible for land and facilities at Fort Gordon. The Directorate of Public Works and Logistics (DPWL) is the primary action agency with regards to the lands.

1.4.1.3 Directorate of Public Works and Logistics

Much of the responsibility for implementation of the INRMP is within the DPWL which acts as caretaker for the lands of Fort Gordon.

Environmental Division

Natural Resources Branch. The preparation and most of the implementation of the INRMP are the responsibility of the Natural Resources Branch (NRB) of the Environmental Division (ED) at Fort Gordon. Other general NRB responsibilities with regard to this plan include:

- Provide training for personnel involved in the management of Fort Gordon's natural resources.
- Provide personnel and equipment support for repair, maintenance, and construction of natural resources facilities, if assessed for in-house accomplishment.
- Implement the Natural Resources Management prescriptions and coordinate prescriptions with Range Control and other affected organizations.
- Provide necessary equipment, personal protective gear, and materials to accomplish management strategies.

Fish and Wildlife Section. The main responsibility for the implementation of this plan falls on the Fish and Wildlife Section. Below are responsibilities specific to the Fish and Wildlife Section:

- Plan and carry out fish and wildlife management tasks through biologically sound fish and wildlife management techniques.
- Provide expertise and support to the Garrison Commander to ensure compliance with restrictions set forth in the Endangered Species Act (ESA) of 1973, as amended and other applicable laws.

- Set hunting season opening and closing dates, bag limits, and other regulations governing the harvest of fish and wildlife resources in cooperation with the Georgia Department of Natural Resources (GADNR).
- Coordinate, through the NRB, with state and Federal fish and wildlife management agencies in fulfillment of installation fish and wildlife management duties and responsibilities.
- Coordinate, through the NRB, with the Provost Marshall to ensure Federal, state and installation laws and regulations pertaining to fish and wildlife are enforced.
- Develop information for the public, hunters, and fishermen in coordination with the Public Affairs Office (PAO).
- Coordinate the preparation and implementation of the RCW Endangered Species Management Component (ESMC) by designating RCW habitat to be burned; providing direction on forest and fire management activities conducted in RCW habitat; and providing personnel and equipment resources to assist the Forestry Section during prescribed burning and wildfire suppression.
- Support the Integrated Training Area Management (ITAM) Program, particularly Land Condition Trend Analysis (LCTA) and Land Rehabilitation and Maintenance (LRAM) components through the NRB.

Forestry Section. The Forestry Section has significant responsibilities in the implementation of this plan. Below are the responsibilities specific to the Forestry Section:

- Maintain an inventory of Fort Gordon's forest resources.
- Restore and manage for longleaf pine/wiregrass (*Aristida stricta*) ecosystem on suitable sites.
- Conduct and manage the sale of Fort Gordon's marketable forest resources.
- Implement and manage a wildland fire program to reduce forest fuels and support ecosystem management.
- Implement portions of the RCW ESMC pertaining to forest management.
- Implement and incorporate Georgia's Best Management Practices (BMPs) for Forestry.

1.4.1.4 Directorate of Plans, Training, Mobilization and Security

The Directorate of Plans, Training, Mobilization and Security (DPTMS) via its Range Control Division is a vital component in the implementation of portions of this plan. Below are responsibilities of Range Control, relative to the implementation of the INRMP:

- Coordinate with and inform DPWL of military training requirements and objectives as it relates to the implementation of short and long-term range development plans
- Coordinate with DPWL on upcoming training activities that may affect natural resources.
- Provide a daily range and training area utilization schedule to the Provost Marshal, Game Warden Section, for control of hunters and recreational users.

1.4.1.5 Directorate of Family, Morale, Welfare, and Recreation

The Directorate of Family, Morale, Welfare, and Recreation (DFMWR) is responsible for some recreational aspects of certain hunting and fishing programs. Below are specific responsibilities of DFMWR:

- Plan and conduct group hunting and fishing activities, such as, fishing tournaments, kid's fishing events, and operation of the Fort Gordon shooting preserve.
- Operate and maintain the Fort Gordon Tactical Advantage Sportsman Complex Range which presently consists of an archery range, skeet and trap range, sporting clays course, long distance range, and the Sportsman Club Lodge.
- In cooperation with the Fish and Wildlife Section, operate the selling of hunting and fishing licenses on Fort Gordon. Monies collected from these licenses will be deposited into the Army Fish and Wildlife Conservation Fund (21X5095). DFMWR shall receive no more than 10 percent of annual revenues for fee collection administration.
- Plan and develop facilities relating to fish and wildlife resources, such as camping areas and game processing facilities.
- Participate in national and state-sponsored hunting and fishing events such as National Fishing Week, and National Hunting and Fishing Day.

Outdoor Recreation Program. The DFMWR is responsible for developing the installation's Outdoor Recreation Plan and coordinating with DPWL. The Outdoor Recreation Program is also responsible for the movement of persons, special events, and organizational elements of outdoor recreation at Fort Gordon. Below are specific responsibilities:

- Plan and conduct group outdoor activities, such as, use of the Hilltop Riding Stables, and operation of the Pointes West Army Recreation Area.
- Plan and develop facilities relating to outdoor recreation resources, such as, camping areas, hiking trails, and picnicking areas.
- Develop rules and user fees, identification and maintenance of access points, and distribution of outdoor recreation user guidance (e.g., signs, maps, brochures, tour guides).
- Participate in national and state-sponsored outdoor events such as National Fishing Week, and National Hunting and Fishing Day.

1.4.1.6 Directorate of Emergency Services

The Directorate of Emergency Services is consolidated law enforcement service including patrol operations, investigation, police, physical security and game wardens.

Provost Marshal. The Provost Marshal is responsible for enforcing laws on Fort Gordon, including those pertaining to hunting and fishing, and other natural resources recreation. Specific responsibilities of the Fort Gordon Game Warden Section are listed below.

- Enforce Federal, state and installion laws and regulations pertaining to fish and wildlife, and boating safety.
- Record game kills and maintains other records to ensure compliance with season bag limits.
- Patrol woodlands and waters of the Installation to enforce laws and regulations pertaining to fish and wildlife, boating safety, endangered species, and illegal dumping.
- Execute warrants pertaining to the violation of laws and regulations regarding fish, wildlife, and hunting, fishing or boating.
- Seize and take possession of all wildlife or parts thereof taken, caught, killed, captured, possessed or controlled in

any manner or for any purpose contrary to the laws and regulations pertaining to fish and wildlife.

- Seize as evidence, without warrant, any device other than a boat, vehicle or aircraft when there is cause to believe that its possession or use is in violation of any provisions of laws or regulations dealing with fish and wildlife.
- Arrest, if necessary, without arrest warrant any person found violating laws or regulations pertaining to fish, wildlife, hunting, fishing or boating.
- Recommend and enforce suspension of access privlileges for specified infractions of laws and regulations pertaining to fish, wildlife, hunting, fishing and boating.
- Ensure cooperation between the DES and the DPWL Fish and Wildlife Section for the proper copletion of wildlife law enforcement duties and responsibilities.
- Coordinate with other state and Federal law enforcement agencies as necessary for the proper completion of wildlife law enforcement duties and responsibilities.
- Ensure Fort Gordon wildlife law enforcement personnel are qualified and trained to carry out all assigned duties and responsibilities.
- Provide sufficient equipment to support the wildlife law enforcement program for proper completion of program responsibilities.

1.4.2 External stakeholders

USFWS and GADNR are an integral part of the INRMP development, review, and revision process for Fort Gordon. The USFWS and GADNR cooperate in the development of the INRMP and participate in the annual reviews and revisions. Furthermore, the USFWS and GADNR participate in the formal 5-year revision of the Fort Gordon INRMP. Fort Gordon can help ensure that the USFWS and GADNR remain committed as partners with the Army by implementing their recommendations in future reviews and revisions of the Fort Gordon INRMP. A Cooperative Agreement between Fort Gordon, and USFWS and GADNR is provided in Appendix C.

1.5 AUTHORITY

This plan was prepared to meet statutory requirements under the Sikes Act Improvement Amendment, Public Law (PL) 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022. In

November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a *et seq.*, was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate such programs, the Sikes Act requires the secretary of each military department to prepare and implement an INRMP at appropriate military installations throughout the U.S. under their respective jurisdictions, unless the secretary determines the absence of significant natural resources on a particular installation makes the preparation of such a plan inappropriate. In addition, the Act requires that the INRMP is prepared in cooperation with, and reflects the mutual agreement of, the Secretary of the Interior (acting through the Director of the USFWS) and the head of each appropriate state fish and wildlife agency for the state(s) in which the military installation concerned is located.

Army Regulation (AR) 200-1 (*Environmental Quality – Environmental Protection and Enhancement*, dated August 2007 [AR 200-1]) is the implementing regulation that ensures the policies, procedures, and standards for the conservation, management, and restoration of natural resources on military installations are consistent with and in support of the military mission and in consonance with national policies. Additionally, the AR provides general requirements for the content of installation INRMPs, as well as, criteria for achieving integration with the installation's mission and other activities. Cooperative agreements with Federal and state fish and wildlife agencies set forth in this regulation are superseded, under the amended Sikes Act, by agency's approval of the INRMP.

1.6 STEWARDSHIP AND COMPLIANCE DISCUSSION

The responsibilities of the natural resources management program at Fort Gordon as provided by the U.S. Army can be classified as either meeting stewardship needs or compliance requirements. Stewardship projects (*e.g.*, watchable wildlife project) are based upon the land management responsibility of the U.S. Army, and are not required to be implemented to meet regulatory needs. Compliance projects (*e.g.*, endangered and threatened species surveys) are mandatory and are required to be implemented to meet laws and regulations that apply to the operations of Fort Gordon.

Fort Gordon considers its stewardship responsibilities during the planning and analyses of natural resources and training projects. For example, potential erosion and mitigation measures to

eliminate or reduce erosion would be considered when planning for the construction of a new range or facility. By considering its stewardship responsibilities during the planning and analysis phase, Fort Gordon would eliminate or minimize potential soil erosion and sedimentation in streams and other waterbodies on the installation.

1.7 REVIEW AND REVISION PROCESS

In accordance with the Sikes Act of 1997 (16 USC. Sec. 670a *et seq*.), DoD, and U.S. Army policy (DoD Instruction 4715.3), Fort Gordon will review the INRMP annually in cooperation with USFWS and GADNR and modify the plan as necessary. Further, Fort Gordon will revise the INRMP every 5 years in coordination with USFWS and GADNR. DoD Instruction 4715.3 also requires installation conservation programs to be internally reviewed (installation personnel) annually and externally reviewed (DoD representative) at least every 1 to 3 years. The INRMP will be evaluated annually in the following seven performance areas:

- INRMP Implementation;
- Partnership/Cooperation and Effectiveness;
- Team Adequacy;
- INRMP Impact on the Installation Mission;
- Status of Federally Listed Species and Critical Habitat;
- Ecosystem Integrity; and
- Fish and Wildlife Management and Public Use.

Annual reviews of the Fort Gordon INRMP will include annual revisions so that the review and revision processes are integrated. TRADOC must approve each updated version of the INRMP prior to implementation.

1.8 MANAGEMENT STRATEGY

The purpose of natural resources management at Fort Gordon is to support the military mission while maintaining the integrity and biodiversity of the ecosystem. Natural resources management at Fort Gordon relies on an ecosystem-based management philosophy. This strategy blends multiple-use needs and provides a consistent framework to managing military installations, while ensuring the integrity of the ecosystem. The principles, policies, and goals of this type of management system are provided below.

1.8.1 Ecosystem-Based Management Approach

Ecosystem-based management is the current management philosophy being endorsed by the DoD and other Federal agencies.

"*Ecosystem-based conservation is a broad approach to natural resources management that involves identifying, protecting, and restoring complete ecosystems – including the structural components and the processes they undergo – while fully incorporating social, economic, and other human concerns into planning*" (Leslie *et al*., 1996).

The natural resources staff takes an ecosystem approach to management of resources at Fort Gordon. This includes addressing concerns and managing resources at a landscape level and identifying the cumulative impacts of land management techniques.

This philosophy emerged in the 1990s as a response to scientific concerns over decreasing biodiversity at all levels of biological systems. Because the DoD is responsible for more than 25 million acres of public lands within the U.S., the issue of biodiversity is relevant to the military. Specifically, the U.S. Army manages approximately 12.5 million acres, the U.S. Air Force (USAF) 9.0 million acres, and the Department of the Navy approximately 3.5 million acres. DoD is the fifth largest Federal land manager in terms of acreage (Leslie *et al.*, 1996).

DoD managed lands represent approximately three percent of the total Federal land holdings. However, there is strong evidence that DoD lands have a disproportionately high biodiversity. According to the DoD there are more than 220 Federally listed species confirmed as residents on military lands. In terms of acreage managed, the number of listed species on DoD lands is disproportionately high compared to other Federal agencies (Leslie *et al.*, 1996). This is a direct reflection of the wide range of training environments and strategic locations maintained by the DoD to ensure military readiness. DoD lands include large holdings of a number of vegetative community types, which relates to the diversity of animal species that inhabit these community types. Because of the large land holdings, number of Federally listed species compared to acreage, and the variety of vegetative community types, DoD controlled lands have a substantial biological significance (Leslie *et al.*, 1996).

The Future Ecosystem Condition (FEC) is a future state of ecological processes that can be realized if goals and objectives are met. FECs are expressed in the context of a military training environment and are organized around the central theme of

ecological integrity. Desired ecosystem conditions should be achievable and based on the natural or historic range of ecosystem variation as best as can be determined. Some key FECs include, in abbreviated form:

- the RCW installation population goal is obtained;
- landscape-scale native species richness are maintained;
- invasive species are controlled;
- at least 24,268 acres on Fort Gordon are managed as pine and mixed pine/hardwood with longleaf as the predominant upland species;
- fire-adapted communities burn every 1 to 5 years;
- hardwood community diversity includes viable populations of all appropriate species;
- and hydrologic regimes and erosion rates reflect natural rates.

1.8.2 Policy Background

In the 1990s, the military reviewed its natural resources management philosophy in an attempt to improve performance through new management techniques. DoD's commitment to ecosystem management was evident in new policy set forth in 1994. On 8 August 1994, the Deputy Under Secretary of Defense (Environmental Security) issued a policy directive for the *Implementation of Ecosystem Management in the DoD* (Appendix D). This policy directive provides an important change in the philosophy of how DoD will manage its lands. The policy directive states:

> *"ecosystem management will include: a shift in focus from the protection of individual species to management of ecosystems (ecological approach); formation of partnerships to achieve shared goals (partnerships); public participation in decision making (participation); use of the best available science in decision making (information); implementation of adaptive management techniques (adaptive management)" (*DoD 1994*).*

To further their commitment to ecosystem-based management, DoD and the U.S. Army both have signed a Memorandum of Understanding (MOU), along with 12 other Federal agencies that endorse ecosystem-based natural resources management (Appendix E). The MOU sets forth the following policy:

> *"The Federal government should provide leadership in and cooperate with activities that foster the ecosystem approach to* natural resources *management, protection, and assistance. Federal agencies should ensure that they utilize their authorities in a way that facilitates, and does not pose barriers to, the ecosystem approach. Consistent with their assigned missions, Federal agencies should administer their programs in a manner that is sensitive to the needs and rights of landowners, local communities, and the public, and should work with them to achieve common goals"* (MOU 1995).

Ecosystems are important components of environmental systems (Levine 1991). Ecosystem components, living and non-living, are linked together by numerous flows of matter and energy (Levine 1991). Ecosystems involve repetitive or cyclic phenomena and typically contain a great diversity and number of species, individual organisms, and abiotic components. The living members of ecosystems exhibit a wide array of behaviors, and intra- and inter-species interactions are varied and often subtle. Recognizing that crucial interdependencies exist within and between ecosystem components is important in establishing successful environmental management policies.

Ecosystem management is the centerpiece of environmental policy in the late 20th and early 21st centuries and is a unifying approach for the management of military lands. Ecosystem management's broad-based approach to natural resources management involves identifying, protecting, and restoring complete ecosystems — including abiotic structural components and natural processes — while fully incorporating social, economic, and other human concerns into planning (DoD 1996).

1.8.3 Ecosystem Management Goals

Fort Gordon has established seven management goals to integrate the ecosystem-based management. These goals were discussed in detail in Section 1.3.3 of this INRMP.

2.0 CURRENT CONDITIONS AND USE

2.1 INSTALLATION INFORMATION

2.1.1 General Description

Fort Gordon encompasses approximately 55,600 acres in east central Georgia. Fort Gordon's central installation is located at approximately latitude 33°20'N, longitude 82°15'W. The majority of the installation and the entire cantonment area lie within Richmond County, with a small portion of the training area in Jefferson, Columbia, and McDuffie counties. Fort Gordon is located approximately 145 miles east of Atlanta, Georgia and approximately 115 miles northwest of Savannah, Georgia. Augusta, Georgia is the nearest urban center and is located approximately 9 miles northeast of the installation. Fort Gordon is bound to the north by U.S. Highway 78, on the east and south by U.S. Highway 1, and on its western perimeter by U.S. Highway 221. Interstate 20 (I-20), located 2 miles north of the installation, and Interstate 520 (Bobby Jones Expressway, I-520), located 2 miles east of Gate One, provide access to the installation. There are no public roads or highways on the installation (Figure 2-1).

Approximately 50,000 acres (90 percent) of Fort Gordon is used for training missions. The installation is subdivided into 49 training areas (TAs), two restricted impact areas (small arms and artillery), and two cantonment areas (main and industrial) (Figure 2-2). Impact areas occupy approximately 13,000 acres and on-post maneuver and TAs occupy approximately 37,000 acres. The remaining 5,590 acres is occupied by cantonment areas which include military housing, administrative offices, community facilities, medical facilities, industrial facilities maintenance facilities, supply/storage facilities, lakes and ponds, recreational areas, and forested areas.

The installation operates 14 live fire ranges, one dud impact area, one demolition pit, one indoor shoot house, one convoy live fire familiarization course, two military operations on urban terrain (MOUT) site/building clearings, and one nuclear, biological, and chemical (NBC) chamber. Training primarily consists of advanced individual signal training and unit employment of tactical communications/electronics operations. Additionally, artillery demolition, aerial gunnery load master drop zone, and airborne troop training are conducted on Fort Gordon.

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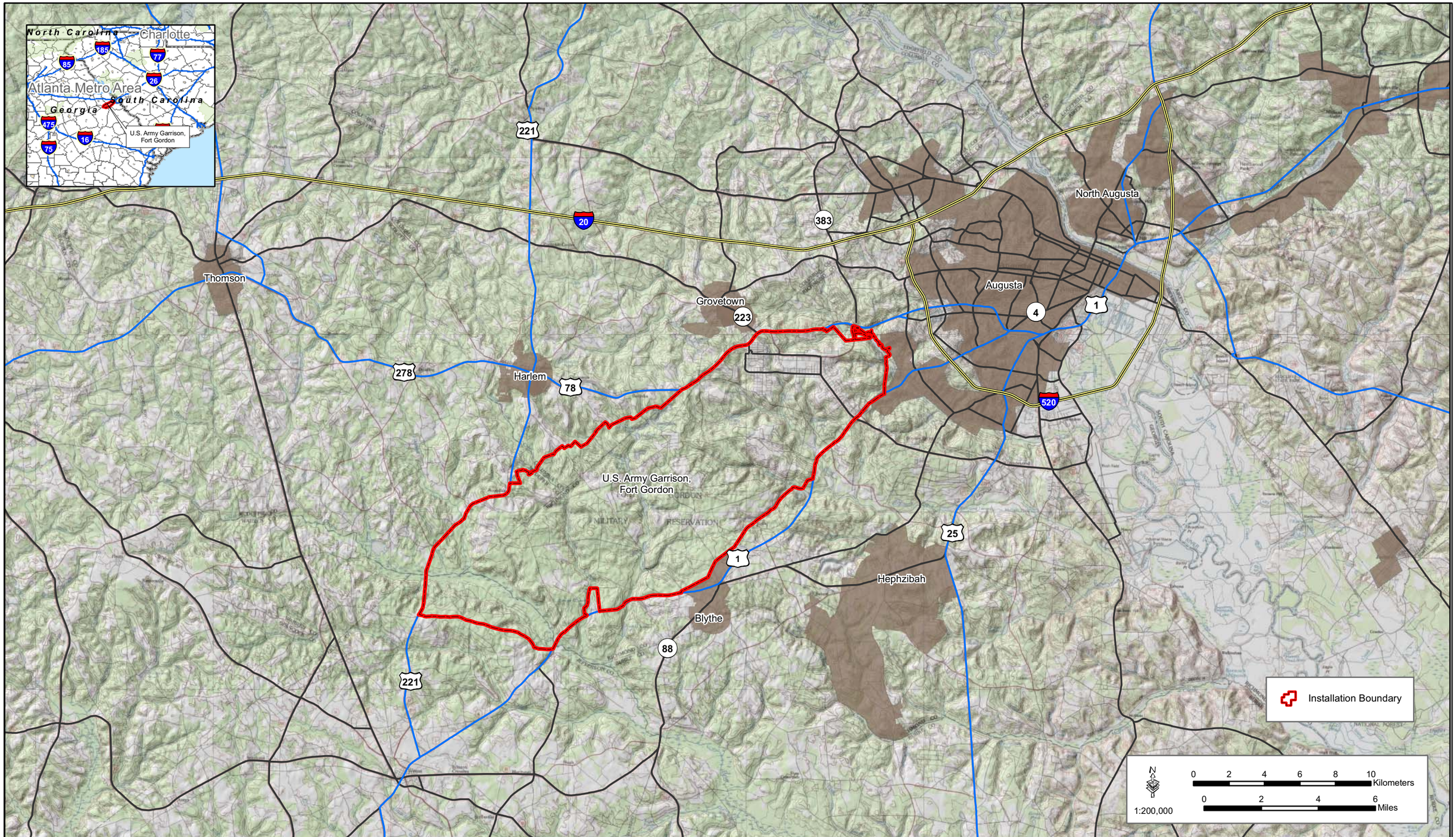

Figure 2-1: Major Transportation Routes Serving Fort Gordon

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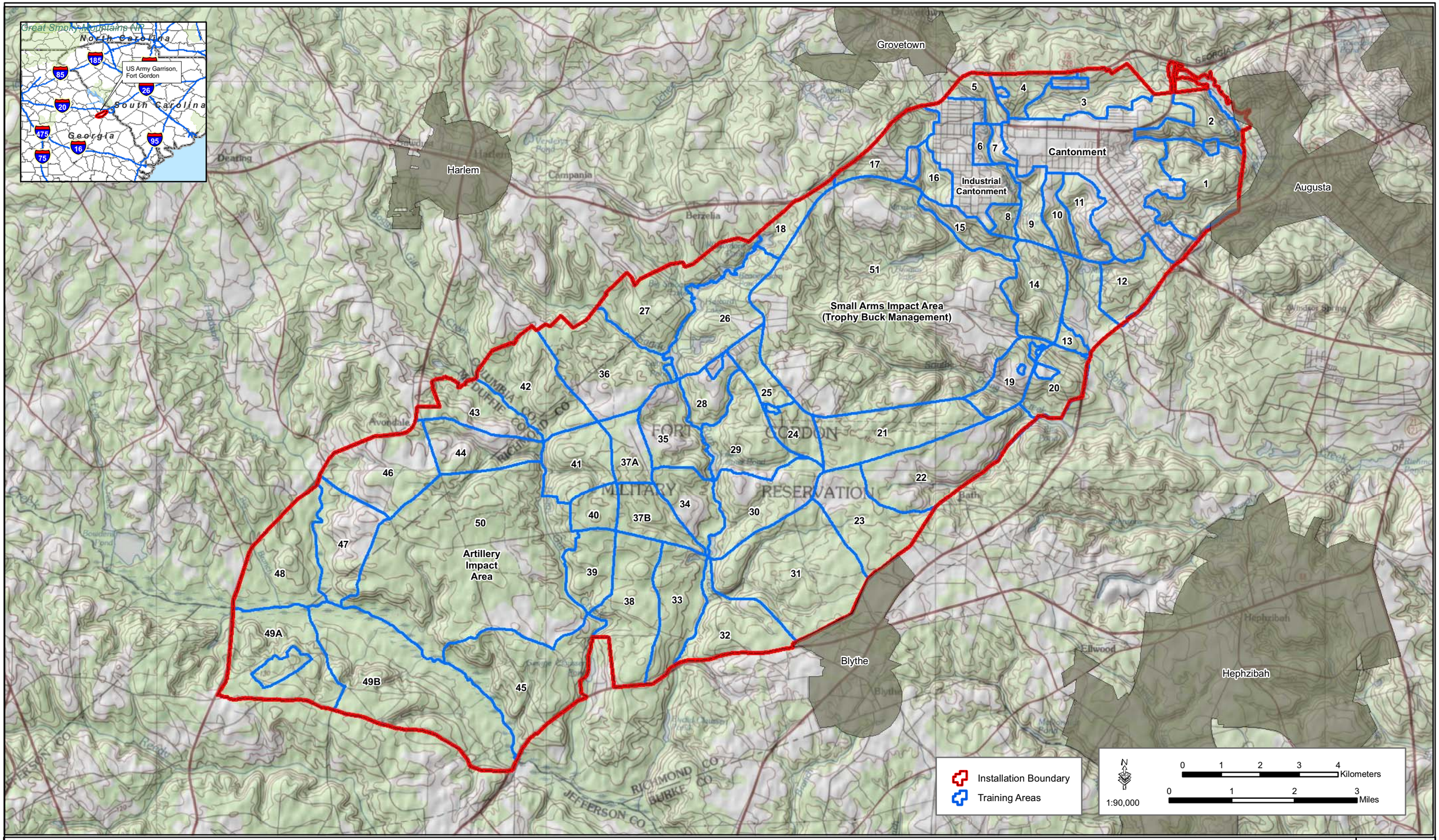

Figure 2-2: Training Areas on Fort Gordon

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2.1.2 Regional Land Uses

The metropolitan area around Fort Gordon encompasses five counties in the states of Georgia and South Carolina (Figure 2-3). Augusta, Georgia and Aiken, South Carolina are the largest cities within the metropolitan area.

Augusta is the center for commercial manufacturing, transportation, and medical activities in the metropolitan area. Fort Gordon is critical to the economy of the metropolitan area, generating thousands of jobs and billions of dollars in economic activity and tax revenue (Fort Gordon 2005). The area around Fort Gordon is primarily rural with the exception of two large urban population centers within Columbia and Richmond counties.

Fort Gordon is vital to the economy of the metropolitan area surrounding Fort Gordon.

Land uses within 1-mile of Fort Gordon vary from semi-urban to rural (Fort Gordon 2005):

- In western Richmond County, land use adjacent to Fort Gordon follows a pattern of more densely developed areas forming a crescent from the northeast and circling around the perimeter of the installation to Tobacco Road. From the Columbia County line to Tobacco Road the pattern of land use closest to Fort Gordon is single-family residential with some mobile home development. Additionally, there is some multi-family development scattered throughout this area and business/commercial uses along the major thoroughfares such as Gordon Highway and Deans Bridge Road.
- North of Gate 5, the major land use along U.S. 1 is commercial. South of Gate 1 the land use is a mixture of rural residential, commercial, and undeveloped land. Land use along the remainder of U.S. 1 is agricultural in character.
- In Columbia County, the land use closest to Fort Gordon is mixed. The area adjacent to the installation is undeveloped and forms the largest portion of land use adjacent to the installation. However, suburban areas are concentrated in the Evans-Martinez area and in the City of Grovetown.
- Land use adjacent to Fort Gordon in Jefferson and Mc Duffie counties is agricultural in character. Over 88 percent of Jefferson County's total area is devoted to agriculture and forestry.

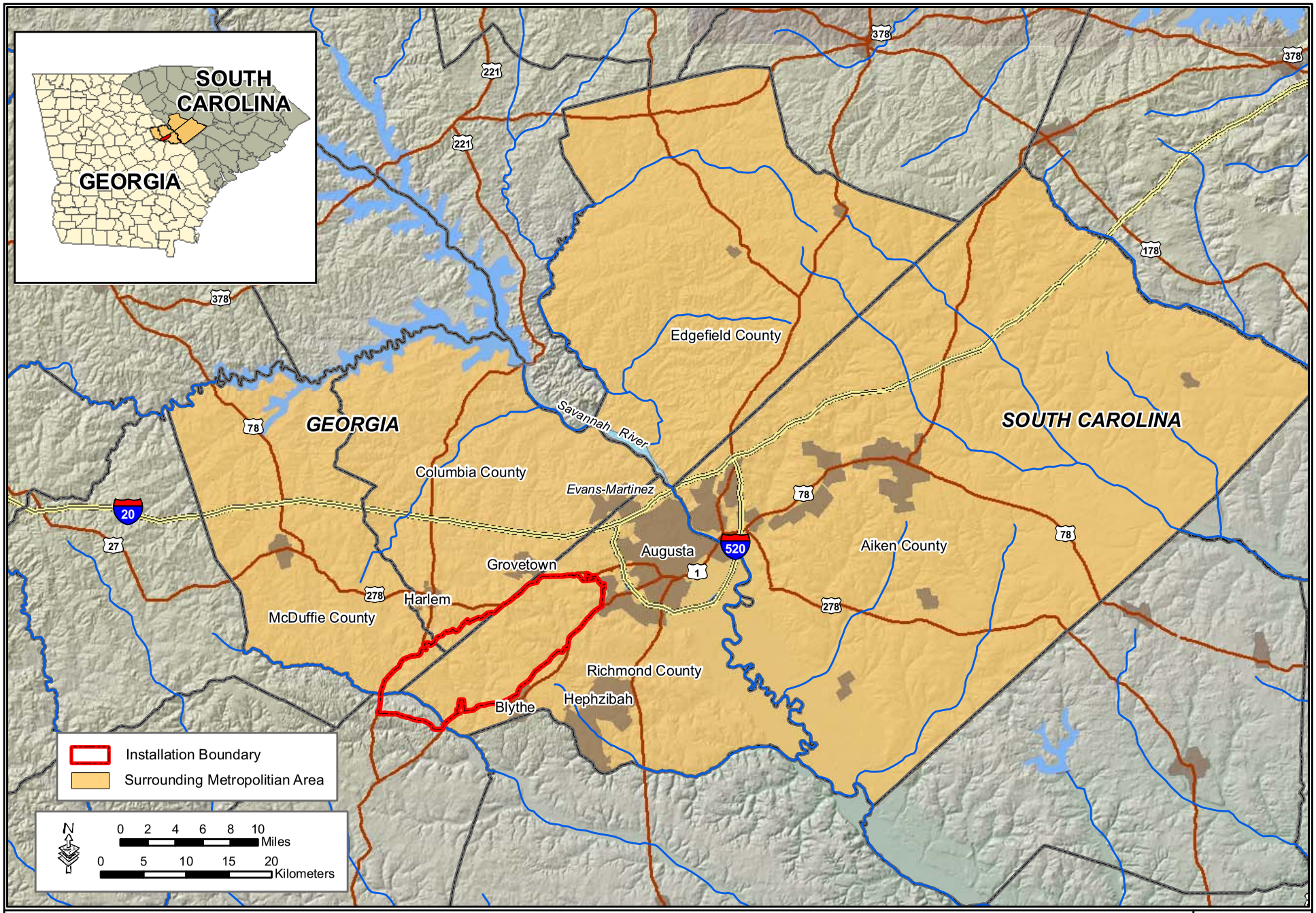

Figure 2-3: Fort Gordon and Surrounding Metropolitan Area

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Fort Gordon is located within an area that produces a substantial portion of the world's commercial kaolin. Kaolin is an essential element in the production of fine paper used for high quality printing, and it is also used as a pigment, opacifier, and strengthening agent in paint, plastic, and rubber. Forest production, kaolin mining, and agriculture are predominant land uses of rural areas surrounding the installation.

2.1.3 Abbreviated History and Pre-Military Land Use

2.1.3.1 Pre-Army History of the Fort Gordon Area

Historical records indicate that the first permanent occupation and use of the area in which Fort Gordon now lies began in the late 18th and early 19th centuries. The first settlers that moved into the area began damming the many streams in the area and constructing water powered sawmills. Timber surrounding these millponds was cut and hauled to the mill to be sawn into lumber. The lumber was then transported by wagon to Augusta for sale. When all the timber surrounding the mill had been cut out, sawmill operators moved to the next drainage and the process was repeated again. The mill houses themselves were either dismantled and moved to the new location or were converted into gristmills. Some of the land that had been cleared of timber was converted into agriculture fields and most of the rest was left fallow. This process continued until the middle of the 19th century when most of the original timber that had been growing in the area had been cut out and agricultural became the primary use of the land in the area. Suitable fields were cultivated for cotton, corn, wheat, and tobacco. Tenant farmers occupied most of the area until the early 20th century.

After the turn of the century, families from Augusta began purchasing land in the area for use as recreational or leisure areas and began building summer residences and clubhouses surrounding many of the existing old millponds. During this period, Georgia Vitrified Clay and Brick Company purchased several hundred acres in the area to use as a source of clay for manufacturing bricks. Current owners of Georgia Vitrified retain mineral rights on a 96-acre tract in TA 35. Little or no timber management took place from the time the original timber was harvested until after Army occupation. Some of the few remaining longleaf pine trees in the area were used for Naval stores production and other trees were cut for local uses such as for fence posts and out building construction. However, most occupants were concerned more with raising agricultural crops than with timber production.

After the beginning of the 20th century, areas that were too wet to farm or that were left fallow began to naturally regenerate themselves with pine seedlings from the few trees that existed along fencerows and in wet areas. Historically, longleaf pine dominated the forested sandy uplands and loblolly pine grew in the wetter soils associated with drainages and in the piedmont type soils found on the installation. Because of the longleaf pine's sporadic seed crops and their more demanding seedbed requirements, many areas once dominated by longleaf pine were taken over by the more aggressive regenerating loblolly pine. Little or no reforestation took place until after U.S. Army ownership. In 1941, the War Department began purchasing the first of the 559 tracts of land that was to become Fort Gordon. Individual tracts ranged from less than 1 acre to several hundred acres in size and altogether totaled approximately 56,000 acres.

2.1.3.2 History of the Army at Fort Gordon

The installation was originally established as Camp Gordon in 1941 and was dedicated on 18 October 1941. It was named in honor of Confederate Lieutenant General John Brown Gordon, who also served as Governor of Georgia and as a U.S. Senator.

Construction of Camp Gordon began in May 1941, and was first occupied on 2 December 1941. During World War II (WW II), Camp Gordon served as a training base for infantry, mechanized infantry, armored cavalry, armor, and as the Southeastern Signal School. The first unit to occupy the new installation was the 4th Infantry Division; however, during WW II, soldiers from the 26th Infantry Division and the 10th Armored Division also trained here. All three units were active in Europe under General George Patton's Third Army. Fort Gordon still serves as home to the 10th Armored Division, although the unit is now inactive.

Camp Gordon also served briefly as a prisoner-of-war (POW) compound toward the end of WW II. A special cemetery was established on-post, near Gate 2, for POWs who died while in captivity at Camp Gordon.

Following the end of WW II, the U.S. Army Personnel Center was established at Camp Gordon. This facility, one of 25 located throughout the country, was responsible for processing returning servicemen, and helping with their transition back to civilian life. The post also became home to a U.S. Disciplinary Barracks until 1947. This was a medium security prison housing military prisoners with sentences of less than 5 years.

In 1948, Camp Gordon became home to the Signal Corps Training Center that moved from Fort Monmouth, New Jersey. The U.S. Military Police School also relocated from Carlisle Barracks, Pennsylvania. During the early 1950s, many other training units were located at Camp Gordon and during the Korean War saw the re-establishment of basic training at the installation, although this was terminated in 1955.

The installation was designated Fort Gordon on 21 March 1956, when it was established as a permanent U.S. Army installation. In August 1956, medical units assigned to Fort Gordon were re-designated Headquarters, U.S. Army Hospital 3441. This hospital eventually became the present Dwight David Eisenhower Army Medical Center (DDEAMC), a Regional Military Health Facility. In 1958, the Civil Affairs School from Carlisle Barracks, Pennsylvania, was relocated to Fort Gordon.

Combat training operations resumed at Fort Gordon during 1961 when the Army Training Center Infantry was activated, providing basic and advanced infantry training (AIT). In June 1962, Signal Corps training was expanded and the training center was designated the U.S. Army Southeastern Signal School. Basic and AIT brigades at Fort Gordon were deactivated in 1970. Further importance was placed on the installation in 1975, when the 1st Signal Training Brigade was activated.

Over the next decade, Signal Corps training was increasingly consolidated at the installation and in 1974, following the relocation of all Signal Corps training units from Fort Monmouth, Fort Gordon was re-designated the U.S. Army Signal Center and Fort Gordon, “Home of the Signal Corps”. The two entities were reorganized in 1978, consolidating all directorates and activities under a single directorate staff.

2.1.3.3 History of Natural Resources Management at Fort Gordon

When Fort Gordon was first established in 1941, the primary land use was farming. This land use was very compatible to bobwhite quail (*Colinus virginianus*), rabbits (*Sylvilagus* spp.), mourning doves (*Zenaida macroura*) and many other small game and nongame species. However, as pine plantations replaced small family farms, the abundant small game populations shifted to big game species such as white-tailed deer (*Odocoileus virginianus)* and eastern wild turkey (*Meleagris gallopavo silvertris*). Many pine plantations were planted with off-site species such as slash and loblolly pine. In these plantations, fire was excluded which allowed the midstory to become heavily occupied by scrub oaks such as,

blackjack oak (*Quercus marilandica*), bluejack (*Q. incana*) and turkey oak (*Q. laevis*). As the midstory became too thick to allow light to reach the forest floor, the native ground cover of grasses and legumes was eliminated or suppressed. Efforts are being made to reestablish the native longleaf pine ecosystem and to reintroduce fire into the ecosystem, to help control the hardwood midstory on sites where longleaf pine and wiregrass once occurred.

In 1962, the Fish and Wildlife Conservation Committee was formed to monitor and guide the Fish and Wildlife Section in the management of natural resources on Fort Gordon. Cooperative agreements were signed by the Commanding General of Fort Gordon and the Director of Georgia's Game and Fish Commission so that Federal and state agencies could combine management efforts. These efforts were primarily for game species such as deer and quail. However, many other game and nongame species benefited from those efforts. Management actions mainly consisted of habitat manipulations such as the creation of 30 lakes, which were reserved as waterfowl areas as well as fishing, installing and maintaining wildlife clearings and the use of prescribed fire. Those and other techniques are still being used today to benefit fish and wildlife on Fort Gordon.

In the mid 1980s the government was gearing toward privatization. In 1986, operation and management of the Fish and Wildlife Section was contracted to a private construction firm. The remaining civil service staff was responsible for the management and monitoring of the contract. This system was in place from 1986 until 1989 when the government decided to bring the Fish and Wildlife and Forestry Sections back under the control of the DPWL, which is the operating system at the present time.

2.1.4 Military Mission

Fort Gordon is the largest communications training facility (130 courses/16,000 troops per year) in the Armed Forces, and is the focal point for the development of tactical communications and information systems (Fort Gordon 2005). The installation trains

soldiers with the most sophisticated communications equipment and technology in existence. The Leader College of Information Technology is the U.S. Army's premiere site for all automation training and home to the Regimental Non-Commissioned Officer (NCO) Academy. Fort Gordon is also the home to the U.S. Army Garrison, the Gordon Regional Security Operations Center (GRSOC, including the 116th Military Intelligence Group, the Naval Security Group Activity (NSA), USAF 31st Intelligence Squadron, and Company D – Marine Cryptologic Support Battalion), 63rd Signal Battalion, the Southeast Region Medical Command, the Southeast Region Dental Command, Southeast Region Veterinary Command, DDEAMC, U.S. Army's only Dental Laboratory, 67th Signal Battalion, Regional Training Site-Medical, National Science Center-Army, two deployable brigades (93rd Signal Brigade and 513th Military Intelligence Brigade), a Georgia National Guard Youth Challenge Academy.

As specified in *USASC&FG Regulation 10-8, Manual of Organization, Missions, and Functions*, the general mission assigned the Fort Gordon Command Element is:

> *Command the U.S. Army Signal Center and Fort Gordon and other U.S. Army personnel and units assigned except those under separate command as specified by higher headquarters. This includes provision of base operations support to tenant and satellite units and activities, organizations, units, and personnel of other military departments and commands; and other departments or agencies of the Government as prescribed in appropriate regulations, directives, and agreements.*

More specifically, the installation Mission includes:

- Command and support all assigned TRADOC, Medical Command (MEDCOM), Network Enterprise Technology Command (NETCOM), and Forces Command (FORSCOM)

activities, units, and sub-installations to include the U.S. Army Signal School.

- Accomplish planning, training, and coordination as directed for the mobilization mission, and prepare administrative and logical support for mobilization forces, including U.S. Reserve Forces.
- Provide base operations support to tenant and satellite units and activities of other military departments and commands. At present, there are 27 tenant activities, the largest and most permanent being DDEAMC activities.

2.1.4.1 Training

The following is a general description of Fort Gordon's training mission. It was developed for use in the installation's Range Development Master Plan and the Army Compatible Use Buffer (ACUB) proposal. The ITAM Coordinator, DPTMS coordinates mission requirements to be included in the program element plans (*e.g.*, ESMC).

In 2006 a total of 34,594 personnel zeroed and qualified weapons, firing 2.1 million rounds on Fort Gordon ranges. In addition, 68,423 personnel utilized Fort Gordon TAs. Training, maneuver and exercise areas within Fort Gordon boundaries generally occur in the western portion of the installation. Several lakes and ponds are scattered among the woodlands and open areas. This portion of the installation supports abundant wildlife habitats.

Mechanized training historically occurred on Fort Gordon and is currently restricted to the GANGB use. Heavy training impacts on Fort Gordon have been limited to two principal areas. The small arms impact area (SAIA) is located in the center of the installation and encompasses 14 active firing ranges. Heavy artillery detonation occurs in the artillery impact area (AIA) located on the western end of the installation (see Figure 2-1).

Range requirements are based on the training strategies and requirements of Fort Gordon units which include a deployable Theater Tactical Signal Brigade, a Strategic Military Intelligence Brigade, the U.S. Army Signal Center with an organic Signal Brigade (IET), Regimental Noncommissioned Officer and Officer Academies, the School of Information Technology, a Tactical Signal Battalion (non-deployable), and a deployable Military Police Detachment. There is also a Joint Regional Security Operation Center, a U.S. Army Reserve Theater Tactical Signal Brigade, and an Army National Guard Engineer Battalion and Military Police

Company (re-stationing effort) on the installation. In addition, three Reserve Component brigade sized medical units and an artillery battalion train on Fort Gordon and utilize its range and TA assets. Special Operations Forces utilize the AIA for aerial gunnery, and the USAF conducts heavy cargo drop training on the Fort Gordon's drop zone day and night, 6 days a week. The unit marksmanship strategies are based on guidance found in U.S. Army Pamphlet (PAM) 350-38, theater deployment and mobilization orders including those defining Soldier Focus Area/Warrior Tasks and Battle Drills requirements, and local command guidance. The units that specifically utilize Fort Gordon are:

- *TRADOC – deployable and fixed units with an average strength of 14,500 Soldiers*
  - 15th Signal Brigade (15 Companies)
  - 73rd OD Battalion (Three Companies)
  - 442d Signal Battalion / LCIT (Three Companies)
  - Regimental Non-Commissioned Officers Academy (RNCOA, Two Company equivalents)
  - 35th Military Police Company (One Company)
  - 434th Army Band (1 Detachment)
- *FORSCOM/NETCOM – deployable units with an average strength of 1,500 Soldiers*
  - 35th Signal Brigade (13 Companies)
- *Intelligence and Security Command (INSCOM) – fixed and deployable joint units with an average strength of 3,500 service personnel*
  - 116th Military Intelligence (MI) GP/National Security Agency Georgia (NSA-GA) (Three Companies)
  - 513th MI Brigade (12 Companies)
- *MEDCOM – fixed and deployable with an average strength at 3,000 personnel*
  - Eisenhower Medical Center Troop Command (Two Companies)
- 3/160 Special Operations Aviation Regiment (1 Company)
- IMCOM – Headquarters and Headquarters Company U.S. Army Garrison (USAG) (One Company)
- National Guard/Army Reserve – deployable with average strength of 13,200 Soldiers (135 Companies)
- USAF Training Squadron C-130/C-17 Heavy Drops/Pilot/Load Master Training

The Fort Gordon Range and TA complex consists of 14 active ranges including a Convoy Live Fire Course and 12 artillery firing points. The ranges are supported by a 7,645-acre SAIA and a

5,217 acre AIA. Adjacent to the ranges are 49 maneuver TAs covering 32,037 acres which is capable of Battalion and Brigade Combat Support, Service Support, Heavy/Light Company level maneuver or Light Airborne Battalion level maneuver. There is sufficient area on the installation to construct a Multi Purpose Range Complex capable of supporting Company and below Stryker operations, although funding would be required to execute ITAM projects in order to make the area more accessible. There is a company sized drop zone embedded in TA 23 that is heavily utilized by the USAF Training Squadrons out of Dobbins Air Force Base (AFB). Fort Gordon's AIA is covered by Restricted Air Space R3004 which supports live fire in the AIA. The range staff is pursuing expansion of R3004, or a SARSA, to enable small arms firing in aircraft over flight areas. Presently, ground observation is used in concert with R3004 to provide early warning to aircraft in the Fort Gordon airspace. Fort Gordon's range staff is comprised of 15 personnel, including five ITAM personnel, that perform management, scheduling, safety oversight, maintenance, land management, LRAM and supply functions for the ranges and maneuver lands.

There are presently in excess of 300 fixed targets arrayed on Fort Gordon ranges. This number is expected to grow to over 700 by the end of Fiscal Year (FY) 2006, adding to the need for compatible buffers and sustainment funding. One of the battalions that comprise the 93rd Signal Brigade may be restationed to Fort Bragg; however, the overall resultant manpower remaining in the 35th Theater Tactical Signal Brigade on Fort Gordon will grow slightly from its present end-strength. The Georgia Army National Guard (GARNG) is going to position a Military Police Company and a Combat Engineer Battalion on the installation as well.

To add to the list of regular users, there is also field testing of U.S. Army Tank-Automotive Research, Development and Engineering Center robotic vehicles. Assorted Federal agencies and local law

enforcement personnel (city, county and state) also utilize the training ranges. The annual summer training period sees a large influx of reserve medical training units for the Golden Medic exercise. The Golden Medic exercise occurs over a 3-month period and involves reserve and National Guard medical training units from across the U.S.

In addition changing mission and training requirements are causing the range and TAs of Fort Gordon to be used in increasingly different ways. Some of the new and expanded mission requirements include:

- Convoy training, including convoy live fire, and qualification record fire (QRF) response (in the future this will include night operations on major training complex roads with the use of night vision devices;
- Improvised Explosive Device situations ingrained into all tactical ground training events;
- Training in a projectile based environment (paintball and Special Effects Small Arms Marking System); and
- Weapons qualifications for all Advanced Infantry Training soldiers.

While the recent Base Realignment and Closure (BRAC) law and Integrated Global Presence Basing Strategy (IGPBS), 2006 – 2011 did not cause major changes in Fort Gordon's mission, there are mission expansions that can greatly increase the need for housing and lead to development in the local areas. The National Security Agency – Georgia (NSAGA) expansion and construction of a new facility will include approximately 3,500 new jobs when completed in FY 2012. Also, as range and facility availability becomes scarcer on larger installations, Army units will increasingly look to installations like Fort Gordon to meet their training needs.

Fort Gordon has recently completed a long-term Range Development Plan (RDP). Future projects include rehabilitation of a hand grenade range (FY 2008), construction of a new Multi-Purpose Machine Gun (MPMG) range (FY 2010), and expansion of Preston Drop Zone (FY 2010). Fort Gordon has sufficient land base to provide an expanded drop zone to facilitate the drop of personnel in addition to the current cargo mission. It also has sufficient land base to reactivate and expand the field landing strip for C-130 and C-17 aircraft capable of Nighttime Vision Google operations due to low ambient lighting conditions. Fort Gordon contains many narrow lakes that can simulate a riverine environment for zodiac special forces training, and can support construction of a new high explosive gunnery range capable of approximately 1 mile of forward maneuver for a Brigade Combat Team.

2.1.5 Operations and Activities

The military mission and management of natural resources in support of the military mission have the potential to affect the natural environment on Fort Gordon. Military training has the potential to disturb the soil surface thus resulting in increased soil erosion and sedimentation of surface waters on the installation. Timber harvesting practices associated with forest and wildlife management activities have the potential to disturb soils and increase soil erosion and sedimentation. In addition, roads and firebreaks are a major source of erosion, especially in training areas. Further, the construction of infrastructure to support the military mission can result in the permanent loss of natural habitats.

2.1.6 Training Constraints and Opportunities

Environmental laws and regulations can pose a threat to the military mission and training on DoD installations. Coordination between environmental staff and range planners, and proper management of resources can prevent constraints to training. On Fort Gordon, RCW management and wetlands limit training activities in certain TAs (Figure 2-4). Training is allowed in wetlands, but must be coordinated with DPWL to ensure training activities are not in conflict with Section 404 and 401 of the Clean

Water Act (CWA). Additionally, military training is restricted within 200 feet of active RCW trees.

This same coordination allows range planners to set aside future TAs that will not be limited by environmental laws and regulations. Present and future areas needed for the military mission are shown in Figure 2-4.

2.2 GENERAL PHYSICAL ENVIRONMENT AND ECOSYSTEMS

2.2.1 Climate

Fort Gordon is located approximately 200 miles southeast of the Appalachian Mountains, 200 miles northwest of the Atlantic Ocean, and 250 miles northeast of the Gulf of Mexico. Due to the influences from the warm waters of the Gulf of Mexico and Atlantic Ocean, the installation's climate consists of warm, humid summers and short mild winters. The average daily temperature for the month of January is 45 degrees Fahrenheit (^{o}F), and 80° F for the month of July. Measurable snow is rare and remains on the ground only a short time when it does occur. The maximum amount of snow ever recorded in the area was 15 inches, occurring in February 1974. Freezing of the ground is rare, and then to only 0.5 to 3 inches in depth, for normally not more than 48 hours. The length of the growing season averages 241 days, lasting from mid-March to mid-November. The first freeze in the fall normally occurs on 12 November, with the last freeze in the spring normally occurring on 16 March. However, freezing temperatures have been observed as early as 17 October and as late as 21 April. Average annual rainfall is approximately 44 inches, and is fairly evenly distributed throughout the year, with July normally recording the greatest amount, usually in the form of heavy thunderstorms (Fort Gordon 1998).

Winds are predominantly from the southeast during the spring and summer months and westerly or northwesterly during the winter. Average relative humidity is moderately high throughout the year with a daily fluctuation in excess of 90 percent at sun-up to less than 60 percent by mid-afternoon. Severe weather, such as tornadoes and hurricanes, most often occurs during the spring; however hurricanes occurring in late summer to early fall can potentially affect the installation (Fort Gordon 1998).

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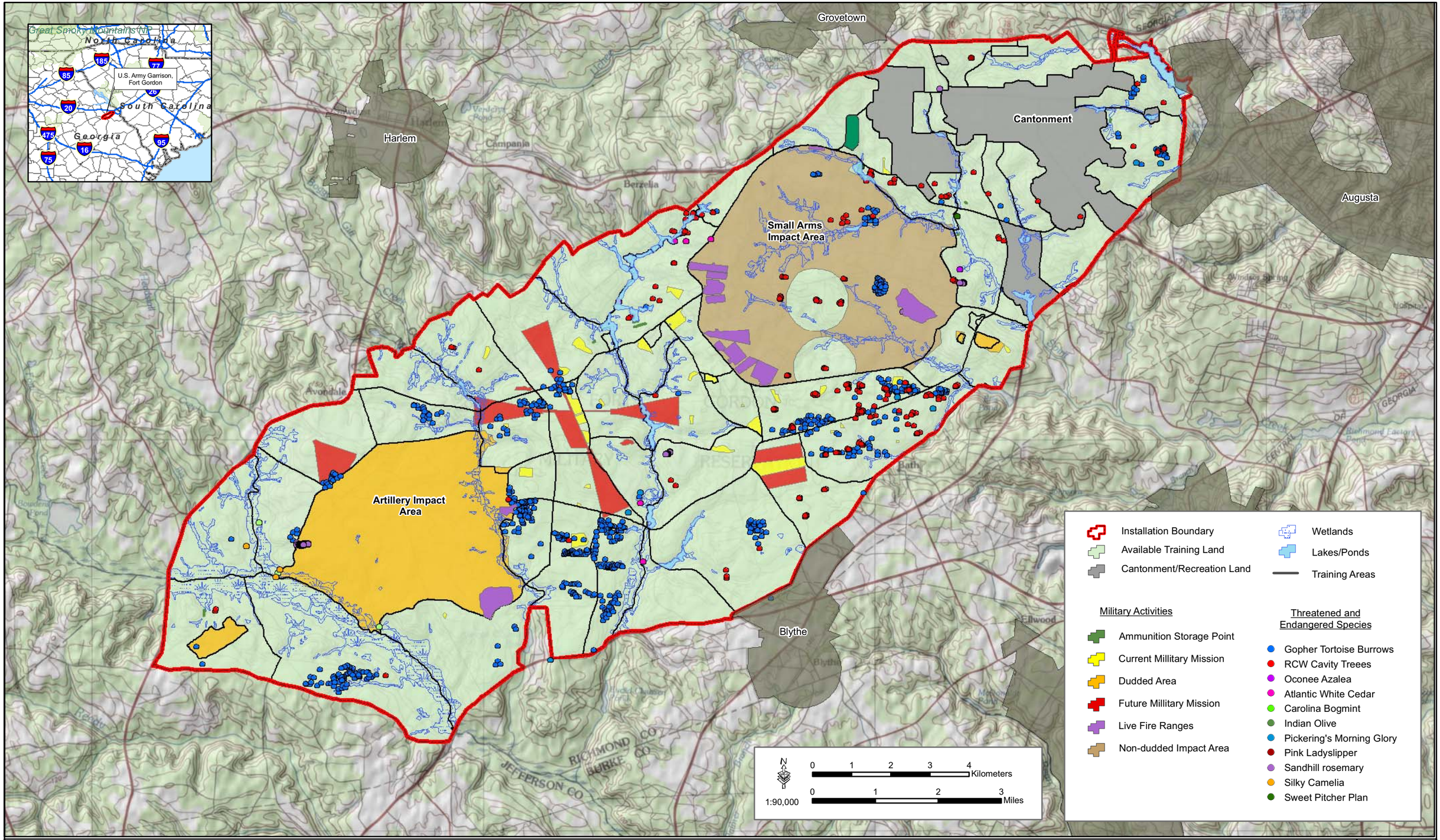

Figure 2-4: Military Constraints and Opportunities on Fort Gordon

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2.2.2 Topography

Fort Gordon is located along the fall line between the Lower Piedmont and Upper Coastal Plains physiographic provinces (Figure 2-5). In this zone of transition, the topography ranges from the gentle undulating sand hills of the south and middle sections, to areas of steep slopes and near-bluffs adjacent to some of the streams, which are characteristically small and bordered by heavy hardwood swamp areas. The elevation of Fort Gordon ranges between 221 feet (ft) and 561 ft above mean sea level (msl), and the majority of the land area (35,852 acres) is between 378 ft and 489 ft above msl.

2.2.3 Geology

Sedimentary rock of the Fall Line Region is composed primarily of two formations, the Barnwell Formation of the Jackson Group formed during the Eocene Period and the Tuscaloosa Formation of the Cretaceous Period. Geologic components associated with the Tuscaloosa Formation include phyllite, quartzose, arkosic sands, kaolin, quartz gravel, and glint kaolin (Frost 1981).

2.2.4 Mining

Fort Gordon is located within an area that produces a substantial portion of the world's commercial kaolin. Georgia's kaolin has traditionally been valued for it use in the manufacturing of ceramic goods (*e.g.*, plates, cups, saucers, door and cabinet knobs, light switches, *etc.*). This tradition dates back to colonial times. Modern uses also include heat resistant brick and automotive catalytic converters (Fort Gordon 1998).

Extensive mining and exploration in the Fort Gordon area indicates a high probability of substantial kaolin deposits on the installation. A 1,450-acre site has been selected on the installation in Jefferson County as an area that could potentially be mined for kaolin. Except for approximately 190 acres of wetlands, the 1,450-acre site has been almost entirely cleared of trees and is highly disturbed (Fort Gordon 1998).

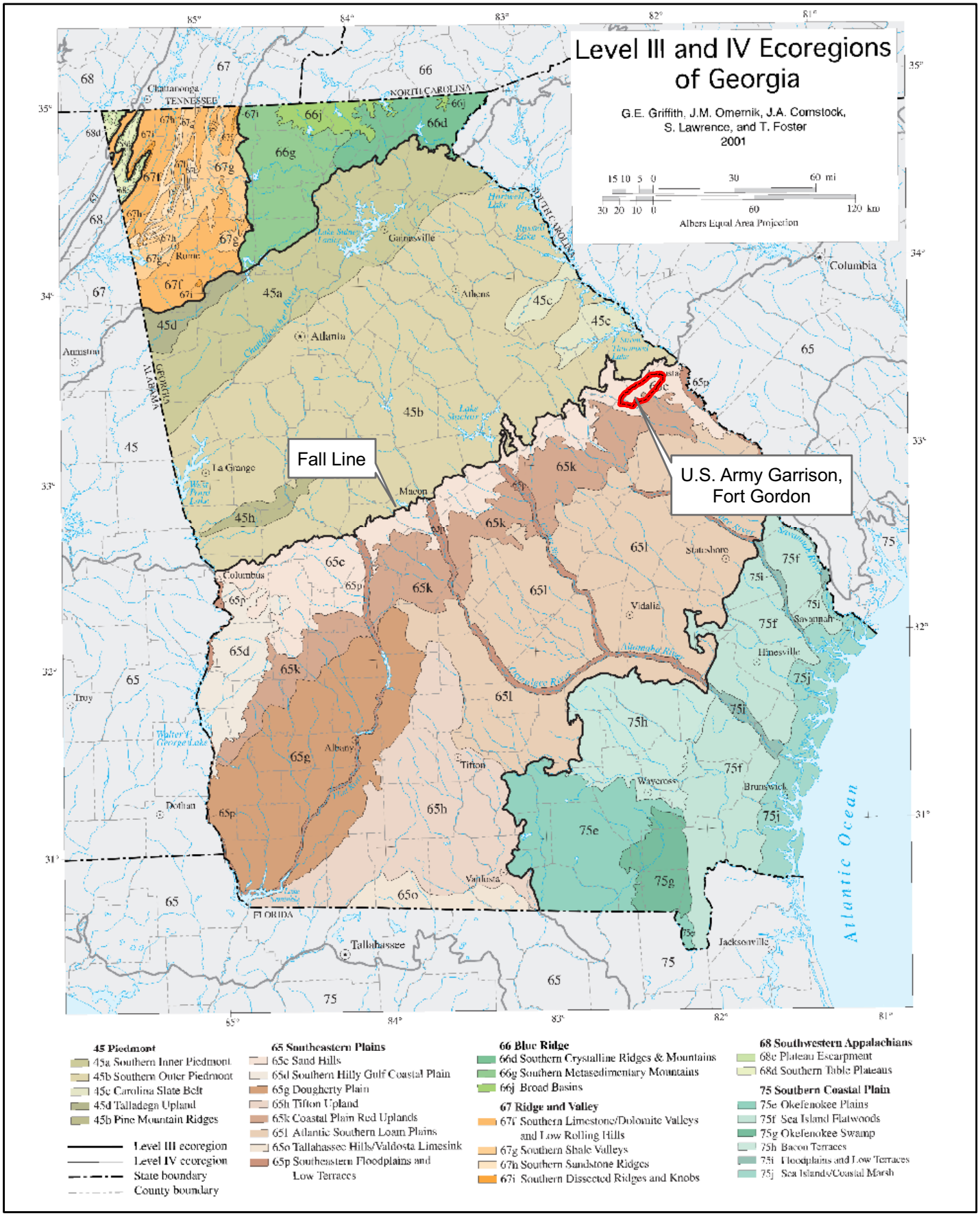

Figure 2-5: Ecoregions of Georgia

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2.2.5 Soils

The U.S. Department of Agriculture (USDA) has performed several soil surveys for this area. One survey was conducted in April 1967 under the sponsorship of the Central Savannah River Area Planning Commission. Another partial survey was completed in September 1978. The Richmond County survey was published in 1981. The soils type names differ between the 1967 and 1981 surveys, even though the soils themselves did not change. The nomenclature and descriptions from the 1981 survey are used in this plan.

The Fall Line Sand Hills Province consists of gently sloping to steep sloping soils derived from marine sands, loams, and clays that were deposited on acid crystalline and metamorphic rocks. The soils are predominantly sandy in character, low in organic matter and moisture holding capacity, very low in natural fertility, strongly acidic, and require varying applications of lime, potash and phosphate. The surface and subsurface soil drainage is excessive requiring more frequent fertilization.

Twenty-six soil classes have been identified on the installation; these soils are further classified by slope and content detail (Figure 2-6). These classifications include such common soil series as Ailey, Bibb, Dothan, Lakeland, Lucy, Orangeburg, Osier, Troup, and Vaucluse. These and other soil series can be grouped into associations based on similarities of soils, relief, and drainage (Frost 1981; Paulk 1981). Creek drainages are characterized by well-drained soils such as Troup-Vaucluse-Ailey associations. Low-lying, poorly drained soils within drainages typically consist of Bibb-Osier associations. These soils are generally dominated by bottomland hardwood communities. Dry, upland habitats are characterized by Troup and Ailey sand series, and are generally dominated by pine/scrub oak communities. Table 2-1 summarizes the soil series found at Fort Gordon and their characteristics.

Table 2-1. Common Soil Series Occurring on Fort Gordon

Soil Series	Characteristics
Troup	Deep, well drained, gently sloping sands, occurring on Coastal Plains ridgetops. Low in natural fertility, strongly acidic, rapid permeability in the surface layer. Slopes typically to 10 percent, up to 17 percent on steep slopes. Moderately suitable for loblolly, longleaf and slash pine; well suited for most urban uses; not suitable for recreational uses.
Lakeland	Deep, excessively drained soils occurring on Sand Hills ridgetops and hillsides. Low fertility, strongly acidic and very permeable. Slopes range from 0 - 10 percent and greater on steep slopes. Moderately suitable for common pine species. Suitable for urban uses but unsuitable for recreational uses.
Orangeburg	Deep, well-drained soils on gently sloping Coastal Plain hillsides. Medium fertility, strongly acidic and moderately permeable. Suitable for loblolly and slash pine and well suited to urban uses.
Lucy	Deep, well-drained, level to gently sloping soils on broad ridgetops and hillsides of the Coastal Plain. Low natural fertility, strongly acidic, and moderately permeable. Moderately suitable to longleaf and slash pine. Suited to urban land uses and limited recreational uses.
Dothan	Deep, well-drained, level to gently sloping soils on broad ridgetops and hillsides of the Coastal Plain uplands. Low natural fertility, strongly acidic, and moderately permeable. Well suited to loblolly and slash pine and urban uses.
Vaucluse-Ailey Complex	Well-drained, gently sloping soils occurring on narrow ridgetops and hillsides of upland Sand Hills and Coastal Plain. Low fertility and strongly acidic. Permeability is slow in Vaucluse soils and the subsurface of Ailey soils, but rapid in the surface layer of Ailey soils. Moderately-suitable for loblolly and slash pine. Well suited to urban uses but too sandy for recreational uses.
Bibb-Osier	Poorly-drained, level, frequently flooded soils of the Coastal Plain floodplains. Strongly acidic with moderate to rapid permeability. Moderately suited to loblolly and slash pine, sweetgum and water tupelo. Poorly suited to agriculture and urban land use.

Source: Frost 1981; Paulk 1981.

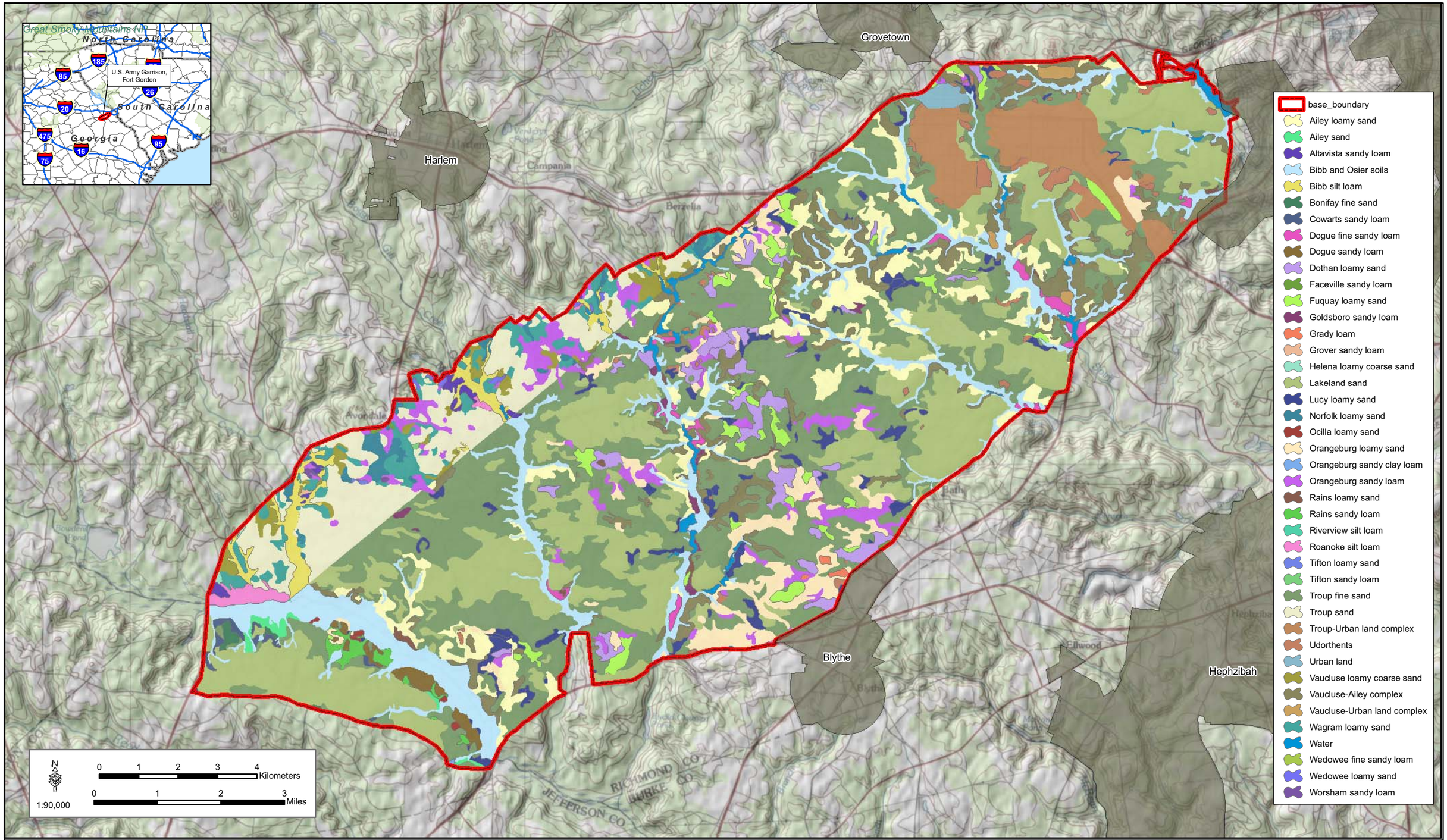

Figure 2-6: Soils on Fort Gordon

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Twelve of the soil types found on Fort Gordon are considered Prime Farmland under the Farmland Protection Policy Act (FPPA) of 1980 and 1995 (Public Law 97-98, 7 USC 4201). According to 7 USC 4201(c)(1)(A), Prime Farmland is defined as "land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oil, seed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, labor, and without intolerable soil erosion." Additionally, six of the soil types found on Fort Gordon are considered Farmland of Statewide Importance. Farmland of Statewide importance is defined as "land that is important for the production of food, feed, fiber, forage, and oilseed crops. It economically produces good yields if the soils are drained or are drained and protected against flooding, if erosion control practices are installed, or if additional water is applied to overcome droughtiness". Soils considered either Prime Farmland or Farmland of Statewide Importance are protected under the FPPA. Approximately 5,091 and 2,652 acres of Fort Gordon are considered Prime Farmland or Farmland of Statewide Importance, respectively. The soils considered Prime Farmland or Farmland of Statewide Importance on Fort Gordon are listed in Table 2-2 and shown in Figure 2-7.

2.2.6 Chemical Analysis

Chemical analyses of improved grounds, and other key areas that require planting, have periodically been conducted on the installation. The first was completed in 1953. A second was completed in 1968. The latest completion on record was 1990.

In 1960, samples were collected from four zones on the cantonment, and selected range areas. The analyses were done by the Soils Testing Laboratory, College of Agriculture, University of Georgia, Athens (UGA Athens). Analysis was for Calcium (Ca), Magnesium (Mn), Nitrogen (N), Phosphorous (P205), and Potassium (K20) content. The first analysis indicated the soils were acidic (pH of 3.5 to 4.5), low in N, low in P205, and low in K20. The latest analysis indicated soils had a pH range from 5.8 to 6.2, low N, medium to high P205, and low to medium K20. Analyses are made on all newly developed areas including ranges and training sites to be grassed and some wildlife food plots. Fertilizer requirements are determined from these analyses. No mechanical analyses were run with these tests.

Table 2-2. Soils on Fort Gordon Classified as Either Prime Farmlands and Farmlands of Statewide Importance

Soil Type	Slope (percent)	Prime Farmlands (acres)	Farmlands of State Importance
Altavista sandy loam	0 to 2	135	
Dogue fine sandy loam	0 to 3	285	
Dogue sandy loam	0 to 2	250	
Dothan loamy sand	0 to 2	1104	
Faceville sandy loam	2 to 5	10	
Faceville sandy loam	2 to 6	14	
Goldsboro sandy loam		110	
Grover sandy loam	2 to 6	8	
Helena loamy coarse sand	2 to 6	23	
Norfolk loamy sand	2 to 6	256	
Norfolk loamy sand	6 to 10	148	
Orangeburg loamy sand	0 to 2	44	
Orangeburg loamy sand	2 to 5	1181	
Orangeburg sandy loam	2 to 6	264	
Orangeburg sandy loam	5 to 8	871	
Orangeburg sandy loam	6 to 10	354	
Riverview silt loam		1	
Tifton loamy sand	2 to 6	9	
Tifton sandy loam	6 to 10	6	
Wedowee loamy sand	2 to 6	18	
Cowarts sandy loam	5 to 8		21
Fuquay loamy sand	1 to 5		877
Lucy loamy sand	1 to 5		432
Lucy loamy sand	5 to 8		437
Ocilla loamy sand	0 to 2		36
Wagram loamy sand	2 to 6		677
Wagram loamy sand	6 to 10		168
Wedowee loamy sand	6 to 10		4
Total		5,091	2,652

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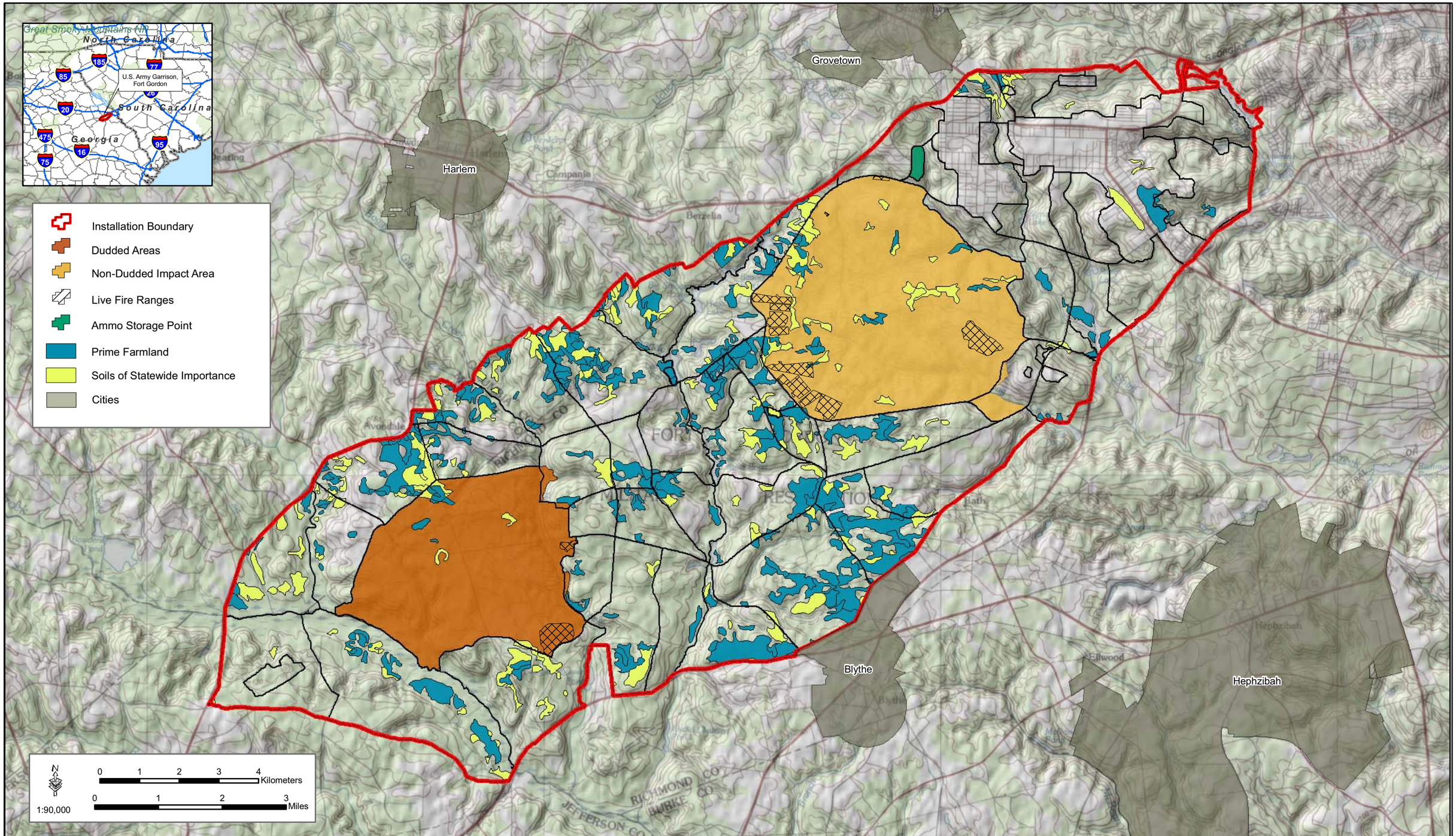

Figure 2-7: Prime Farmland and Soils of Statewide Importance

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2.3 GENERAL BIOTIC ENVIRONMENT

2.3.1 Target Species

Target species for the purpose of this plan refers to Federally endangered or threatened species, species of concern, state listed species, and state tracked species. A total of 16 animals (five birds, two mammals, five reptiles and amphibians, and four fishes) and 11 plant species listed as either threatened, endangered, or species of concern by the USFWS or the State of Georgia are known to occur on Fort Gordon. Table 2-3 lists these species, their status and describes each species' optimum habitat requirement for survival.

The USFWS maintains the list of threatened and endangered species that are protected by the ESA. The ESA provides Federal protection for all species designated as endangered or threatened and provides a means to conserve their ecosystems.

Table 2-3. Target Species Known to Occur on Fort Gordon

Common Name	Scientific Name	Status		Description of Habitat
		Federal	State	
Birds				
Bachman's sparrow	*Aimophila aestivali*	SC	R	Abandoned fields with scattered shrubs, pines, or oaks.
Southeastern American kestrel	*Falco sparverius paulus*	SC	R	Breed in open or partly open habitats with scattered trees and in cultivated or urban areas.
Migrant loggerhead shrike	*Lanius ludovicianus migrans*	SC	Tr	Open wood, field edges.
Wood stork	*Mycteria americana*	E	E	Primarily feed in fresh and brackish wetlands and nest in cypress or other wooded swamps.
Red-cockaded woodpecker	*Picoides borealis*	E	E	Nest in mature pine with low understory vegetation; forage in pine and pine hardwood stands.
Mammals				
Southeastern bat	*Myotis austrororiparius*	SC	Tr	Caves used for hibernating, maternity colonies, and summer roost.
Rafinesque's big eared bat	*Corynorhinus rafinesquii*	SC	R	Buildings in forested regions.
Reptiles and Amphibians				
Gopher tortoise	*Gopherus polyphemus*	SC	T	Well-drained, sandy soils in forest and grassy area, associated with pine overstory.
Southern hognose snake	*Heterodon simus*	SC	T	Open, sandy woods, fields, and floodplains.

Table 2-3, continued

Common Name	Scientific Name	Status		Description of Habitat
		Federal	State	
American alligator	*Alligator mississippiensis*	T (S/A)	NL	Marshes, swamps, rivers, farm ponds, and lakes. Nest in shallow, heavily vegetated, and secluded areas.
Florida pine snake	*Pituophis melanoleucus mugitus*	SC	Tr	Arid pinelands, sandy areas, and dry mountain ridges.
Dwarf waterdog	*Necturus punctatus*	NL	Tr	Sluggish streams with substrate of leaf litter or woody debris.
Eastern tiger salamander	*Ambystoma t. tigrinum*	NL	Tr	Isolated wetlands, pine dominated uplands, and open fields.
Fish				
Bluebarred pygmy sunfish	*Elassoma okatie*	NL	E	Heavily vegetated creeks, sloughs, and roadside ditches.
Savannah darter	*Etheostoma fricksium*	NL	Tr	Shallow creeks with moderate current with sandy or gravel bottoms.
Sawcheek darter	*Etheostoma serriferum*	NL	Tr	Sluggish streams and swamps with sand or mud.
Sandbar shiner	*Notropis scepticus*	R	NL	Large streams to medium-sized rivers.
Plants				
Sandy-woods chaffhead	*Carphphorus bellidifolius*	NL	Tr	Sandy scrub.
Rosemary	*Ceratiola ericoides*	NL	T	Driest, openly vegetated, scrub oak sandhills and river dunes with deep white sands of the Kershaw soil series.
Atlantic white cedar	*Chamaecyparis thyoides*	NL	R	Wet sandy terraces along clear streams and in acidic bogs.
Pink ladyslipper	*Cypripedium acaule*	NL	U	Upland oak-hickory pine forest.
Sandhill gay-feather	*Liatris secunda*	NL	Tr	Fall line sandhills.
Carolina bogmint	*Macbridea caroliniana*	SC	R	Bogs, marshes, and alluvial woods.
Indian olive	*Nestronia umbellula*	SC	R	Dry open upland forest of mixed hardwood and pine.
Sweet pitcher plant	*Sarracenia rubra rubra*	NL	T	Acid soils of open bogs, sandhill seeps, Atlantic white cedar swamps, and wet savannahs.
Carolina pink	*Silene caroliniana*	NL	Tr	Granite outcrops and sandhills near the Ogeechee and Savannah Rivers.
Pickering morning glory	*Stylisma pickeringii var. pickeringil*	SC	T	Coarse white sands on sandhills near the Fall line and on a few ancient dunes along the Flint and Ohoopee rivers.
Silky camelia	*Stewartia malacodendron*	NL	R	Steepheads, bayheads, and edge of swamps.

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Key : E = Endangered, SC = Species of Concern, NL = Not Listed, U = Unusual,
T = Threatened, R = Rare, Tr = Tracked, S/A=Similar of Appearance

The RCW is the only Federally listed species known to reside on Fort Gordon. Fort Gordon's historic RCW population gradually declined in the 1980s and was considered extirpated in 1993. The last confirmed sighting was in the summer of 1990. In 1996 a single male RCW was discovered on Fort Gordon. The bird had fledged in 1995 at the Department of Energy's Savannah River Site. Currently, there are 15 active RCW clusters known at Fort Gordon. Fort Gordon actively manages for the RCW through implementation of the installation's Endangered Species Management Component (ESMC), provided in Section 4.1 of this INRMP. The ESMC also provides for the management of other target species on Fort Gordon.

Red-cockaded woodpecker© USFWS

In addition to the RCW, one other Federally listed animal species, the wood stork (*Mycteria americana*), has been observed on the installation. The wood stork is a Federally endangered species that has been observed foraging and roosting on the installation. Because it is not known to nest on the installation, the wood stork is not considered a resident of Fort Gordon and the installation is not required to manage for this species.

Wood stork© Helsaple Studios

Federal Species of Concern observed on Fort Gordon include, Bachman's sparrow (*Aimophila aestivalis*), southeastern American kestrel (*Falco sparverius paulus*), migrant loggerhead shrike (*Lanius ludovicianus migrans*), gopher tortoise (*Gopherus polyphemus*), southern hognose snake (*Heterodon simus*), Florida pine snake (*Pituophis melanoleucus mugitus*), Rafinesque's big-eared bat (*Corynorhinu rafinesquii*), southeastern bat (*Myotis austroriparius*), Carolina bogmint (*Macbridea caroliniana*), Indian

olive (*Nestronia umbellula*), and Pickering morning glory (*Stylisma pickeringii var. pickeringii*).

Currently, there is a petition to USFWS to list the eastern population of the gopher tortoise in Florida under the ESA. Listing of the gopher tortoise as a Federally protected species could negatively affect training on Fort Gordon. In an effort to prevent future listing of the gopher tortoise under the ESA, the U.S. Army is increasing management efforts for the gopher tortoise on U.S. Army installations. A detailed discussion of gopher tortoise management is provided in Section 4.1.16.

State-tracked species observed on Fort Gordon include mud sunfish (*Acantharchus pomotis*), Savannah darter (*Etheostoma fricksium*), sawcheek darter (*Etheostoma serriferum*), and sailfin shiner (*Pteronotropis hypselopterus*).

2.3.2 Wetlands and Deep Water Habitats

2.3.2.1 Wetlands

Approximately 4,395 acres of wetlands occur on Fort Gordon (Figure 2-8). These wetlands consist of both alluvial and nonalluvial wetlands. Alluvial wetlands are associated with stream channels and depend on the flooding regime of the stream system. With the exception of Brier Creek, the floodplain of most alluvial wetlands on Fort Gordon is inconspicuous due to rolling topography. These streams fit the description of “small stream swamps” where separate fluvial features and associated vegetation are too small or poorly developed to distinguish (The Nature Conservancy [TNC] 2000).

Nonalluvial wetlands are associated in areas where groundwater emerges or precipitation is held close to the soil surface. Nonalluvial wetlands on Fort Gordon included seepage areas and isolated wetlands. Seepage areas occur on saturated soils where the water table remains immediately below the soil surface. Plant species associated with these types of wetlands include, but are not limited to sweetbay magnolia (*Magnolia virginiana*) in the midstory and sweetgum (*Liquidambar styraciflua*) and yellow-poplar (*Liriodendron tulipifera*) in the overstory. Isolated wetlands include small isolated ponds with grasses and herbs as dominate vegetation. If present the overstory consists primarily of sweetgum and blackgum (*Nyssa biflora*) (TNC 2000).

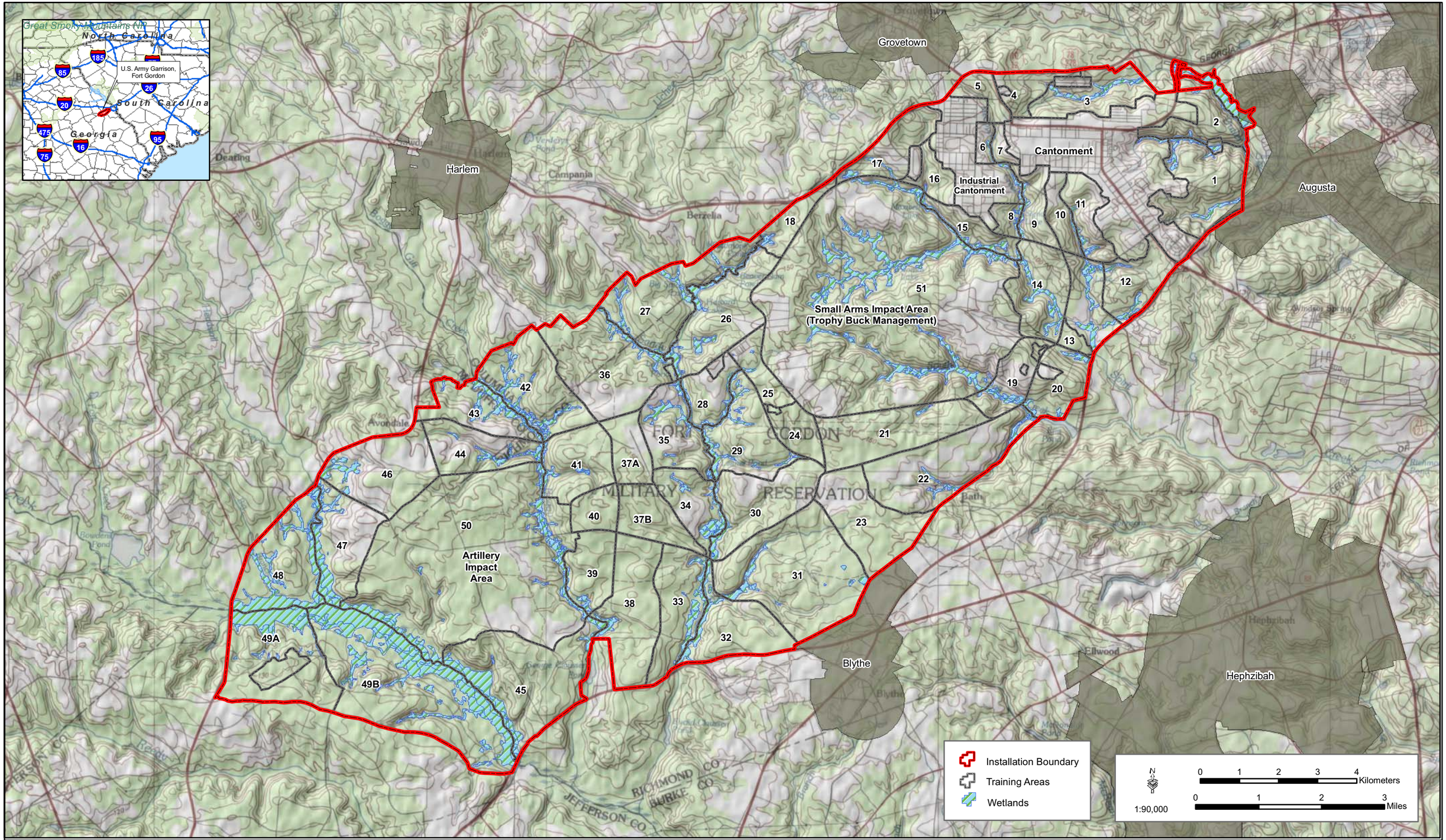

Figure 2-8: Wetlands on Fort Gordon

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2.3.2.2 Lakes and Ponds

Thirty reservoirs and ponds are maintained on Fort Gordon (Figure 2-9). There is a total of approximately 436 acres of reservoirs and ponds on Fort Gordon. These reservoirs and ponds are considered deepwater habitat for aquatic species. A list of impoundments found on Fort Gordon is provided in Table 2-4. The largest are Butler Reservoir (82 acres), Gordon Lake (37 acres), Leitner Pond (29 acres), Lower Leitner Pond (25 acres), and Upper Leitner Pond (24 acres) (see Table 2-3). Of these 30 lakes, 27 are managed for recreational fishing and are discussed in detail in Section 4.4.4 of the Fish and Wildlife Section of this INRMP. Several abandoned millponds were present on the installation at the time of land purchase. Those that were intact were retained for training, soil and water conservation, and recreational use; however, no great effort was made to improve water quality for fisheries until the late 1950s and early to mid 1960s. During that time there was great emphasis placed upon rehabilitating existing impoundments and constructing new ponds, coupled with improvement of the recreational fishing potential under a cooperative agreement with the USFWS Research Extension Service at the University of Georgia, Athens. This resulted in creating a chain of artificial ponds in a stair-step fashion on Little Sandy Run Creek, Sandy Run Creek, Rachel Branch, and an unnamed tributary of Little Sandy Run Creek. This effort has provided many man-days of recreational fishing for military personnel and other authorized users. Lake and pond management is discussed in detail in Section 4.4.6 Fish Management of this INRMP.

2.3.2.3 Potable Water

Fort Gordon purchases water from the City of Augusta, Richmond County for drinking and hydrant water. Water in the outlying area of the installation is supplied from six drilled wells.

2.3.2.4 Streams

There is approximately 93 acres of streams of measurable surface area on Fort Gordon. Surface water drainage at Fort Gordon is generally toward the Savannah River to the northeast. The major drainageways on the installation include Butler, Spirit, South Prong, Sandy Run, Boggy Gut, and Brier creeks (see Figure 2-8). Spirit Creek originates west of the installation boundary, draining in a southeasterly direction to the Savannah River less than 15 miles south of the installation boundary. Butler Creek originates north of

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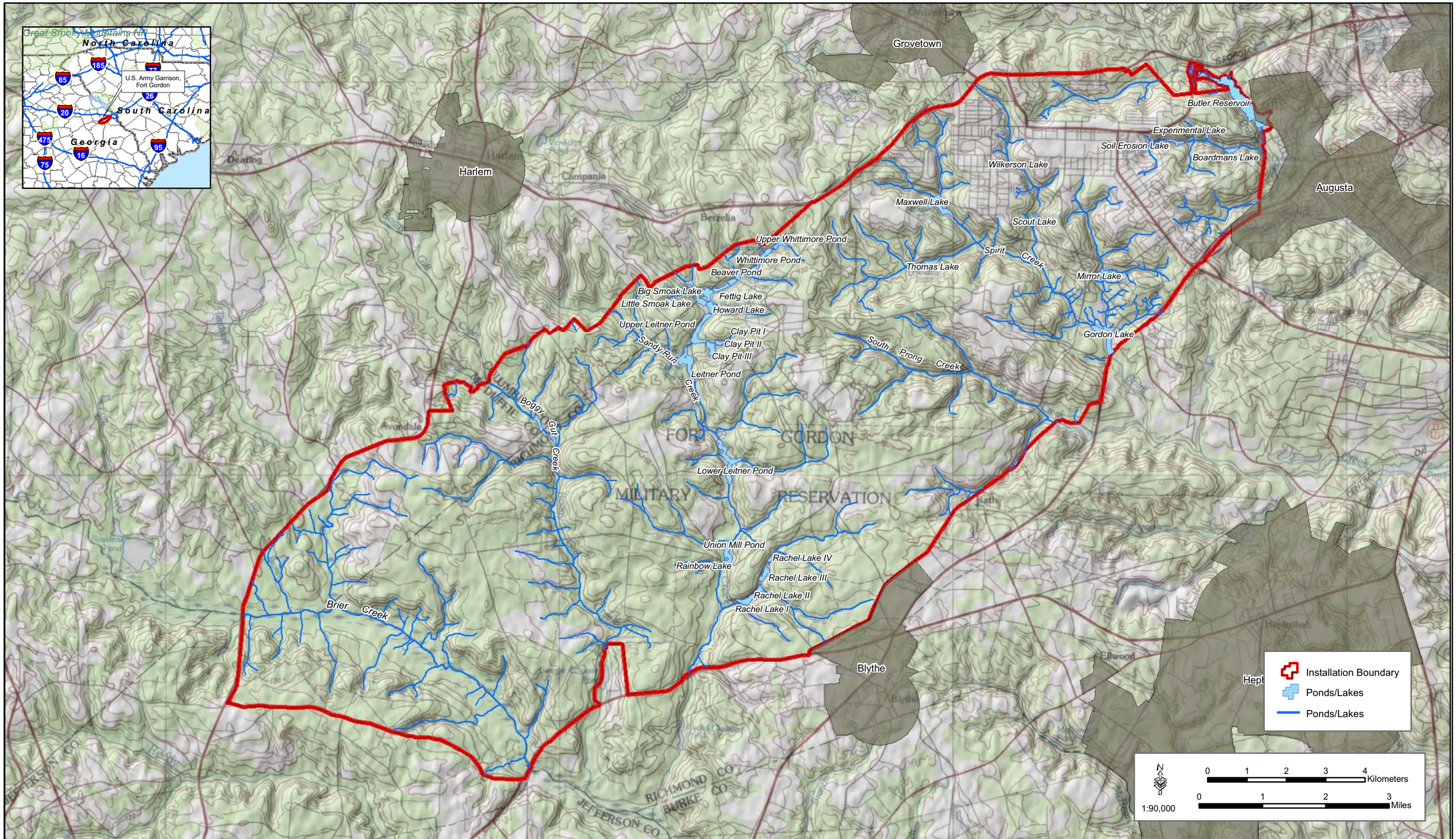

Figure 2-9: Surface Water on Fort Gordon

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Table 2-4. Impoundments Located on Fort Gordon

Name	Area (Hectare)	Area (Acre)	Exist in 1941	Year Built/ Rebuilt	Volume (Acre-Feet)	Dam type	Hydraulic Height (feet)	Hydraulic Length (feet)
Rainbow Lake	1.7	4.1	N	1960s	19	Earth	10	235
Union Mill Pond	8.0	19.8	Y	1960s	69	Earth	8	580
Rachel Lake I	5.4	13.3	N	1960s	52	Earth	9	1020
Rachel Lake II	3.0	7.4	N	1960s	35	Earth	11	565
Rachel Lake III	3.5	8.6	N	1960s	53	Earth	14	320
Rachel Lake IV	1.3	3.2	N	1970s	21	Earth	15	275
Lower Leitner Pond	10.2	25.3	Y	Unk	89	Earth	8	695
Leitner Pond	11.5	28.5	Y	Unk	112	Earth	9	300
Upper Leitner Pond	9.8	24.3	N	1960	128	Earth	12	430
Clay Pit Lake I	5.0	12.4	N	1960s	87	Earth	16	240
Clay Pit Lake II	1.6	4.0	N	1960s	26	Earth	15	310
Clay Pit Lake III	1.2	3.0	N	1960s	15	Earth	11	240
Howard Lake	3.5	8.7	Y	1960s	25	Earth	6	260
Little Smoak Lake	4.9	12.2	N	1960s	40	Earth	7	240
Big Smoak Lake	5.7	14.2	N	1960s	56	Earth	9	220
Fettig Lake	3.4	8.3	N	1960s	29	Earth	8	270
Little Beaver Dam Pond	2.1	5.3	N	1960s	18	Earth	8	485
Beaver Dam Pond	8.4	20.7	Y	1960s	109	Earth	12	385
Whittimore Pond	3.3	8.1	Y	1960s	32	Earth	9	230
Upper Whittimore Pond	5.4	13.3	N	1960s	50	Earth	8	285
Thomas Lake*	7.8	19.3	Y	1960s	101	Earth	12	310
Maxwell Lake*	4.2	10.3	Y	1920s	31	Earth	7	175
Gordon Lake	15.1	37.3	N	1987	120	Concrete	9	515
Mirror Lake	5.0	12.4	Y	1930s	27	Earth	5	460
Scout Lake*	2.3	5.6	Y	1960s, 1987	19	Earth	8	285
Wilkerson Lake	1.6	3.9	Y	1960s, 1992	20	Earth	12	120
Soil Erosion Lake	4.9	12.0	N	1960, 1977, 1992	121	Earth	23	270
Experimental Lake	0.6	1.4	N	1950s	11	Earth	19	250
Boardmans Lake	2.8	6.9	Y	Before 1920, 1992	34	Earth	11	210
Butler Reservoir	33.1	81.9	N	1970, 1992	1009	Earth	28	758

Source: U.S. Army Corps of Engineers (USACE) 1999
* Dam failure, no water impounded at this time.

the installation boundary and, similarly, drains to the southeast into the Savannah River. Brier Creek originates in the Piedmont physiographic region northwest of the installation and drains approximately 70 miles southeast to the Savannah River.

There are 89 streams that account for approximately 88 miles of measured watercourses on the installation. The watercourses have been ranked in order using the objective Strahler System. In this classification, first-order streams lie in the highest parts of a drainage basin, and are the uppermost runoff channels with well-defined banks. Streams of the order "n+1" are formed by the juncture of two streams of equal rank, and not otherwise. This ranking provides a view of the relative magnitude of stream courses. The ranking for streams on Fort Gordon are presented in Table 2-5. Land managers and planners can use stream rankings as a general guide to land-use capabilities as related to free-moving water. Given the terrain structure and the fact that the majority of the watercourses are low-order un-branched tributaries, drainage is quite good, and there is little likelihood of other than very localized flooding of very short duration (U.S. Army Corps of Engineers [USACE] 1999).

Table 2-5. Stream Rankings on Fort Gordon

Stream Ranking (Order)	1	2	3	4	5
Number of Streams	63	17	8	0	1*
Total Length (Miles)	46	18	18	0	6

*Brier Creek enters the installation as a Fifth Order stream.
Source: USACE 1999

Suspended solid loads are normally low within these streams, except during periods of high water or floods. Pollution from industrial and municipal sources is generally low, with the exception of Spirit Creek below the sewage treatment plant (Fort Gordon 1996).

2.3.2.5 Watershed

Fort Gordon lies in the watershed of five separate watercourses. None of the watersheds are wholly within the installation (USACE 1999). Approximate acreages for watersheds found on Fort Gordon are presented in Table 2-6.

Table 2-6. Watersheds Occurring on Fort Gordon

Watershed	Area (acres)
Butler Creek	3,840
Spirit Creek (including South Prong and Bath branches)	19,200
Sandy Run	13,440
Boggy Gut	11,520
Brier/Headstall creeks	12,800

Source: USACE 1999

As part of a larger effort to develop a comprehensive wildlife conservation strategy for the state, GADNR has identified high priority waters for protecting aquatic biodiversity. High priority waters and their surrounding watersheds are a high priority for a broad array of conservation activities, which include at least one of the following: watershed-level protection efforts; restoration activities; reforestation of banks and riparian areas with native vegetation; exclusion of livestock; maintenance or restoration of natural flow and temperature regimes; protection of surrounding lands through conservation easements or land acquisition; and development of physical and biological monitoring programs (Fort Gordon 2007).

Many of the streams identified by GADNR as high priority waters are within Fort Gordon's boundaries (Figure 2-10). These streams are included in Fort Gordon's ACUB buffer and are afforded protection on the Installation as such.

2.3.3 Fauna

2.3.3.1 Terrestrial

Fort Gordon is inhabited by a wide variety of wildlife species. Approximately 136 species of birds have been identified on the installation. It is estimated that approximately 31 species of mammals and approximately 67 species of reptiles and amphibians inhabit Fort Gordon. These species are dispersed throughout the various habitats on the installation.

Common mammal species found on the installation include, but are not limited to, gray fox (*Urocyon cinereoargenteus),* opossum (*Didelphis marsupialis*), striped skunk (*Mephitis mephitis*), and coyote (*Canis latrans*). Common bird species found on Fort Gordon include, but are not limited to, northern bobwhite quail, turkey vulture (*Cathartes aura*), pileated woodpecker (*Dryocopus pileatus*), northern mockingbird (*Mimus plyglottos*), red-eyed vireo(*Vireo olivaceus*), tufted titmouse (*Parus biocolor*), and

carolina chickadee (*Parus carolinensis*). Common reptile and amphibian species found on the installation include, but are not limited to, eastern mud turtle (*Kinosternon subrubrum subrubrum*), eastern box turtle (*Terrapene carolina carolina),* southern fence lizard (*Sceloponts undulatus undulatus*), brown water snake (*Nerodia taxispilota*), and eastern kingsnake (*Lampropeltis getula getula*). A list of wildlife species found on Fort Gordon is provided in Appendix F. White-tailed deer, red fox (*Vulpes fulva*), eastern gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), eastern cottontail rabbit (*Sylvilagus floridanus*), wood duck (*Aix sponsa*), eastern wild turkey, northern bobwhite quail, and mourning dove are actively managed for sport hunting on Fort Gordon. A list of game species that occur on Fort Gordon is provided in Appendix F.

2.3.3.2 Aquatic

The DPWL, ED stocks designated fishing lakes with channel catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and redear sunfish (*Lepomis microlophus*). Stocked ponds are identified in the Section 4.4 (Fish and Wildlife Management) of this document. In addition to these stocked species, approximately 56 species of fish are known to occur on Fort Gordon, including the bluebarred pygmy sunfish (*Elassoma okatie*). This is the only recorded siting in the State of Georgia (Fort Gordon 2001). Common fish species on the installation include, but are limited to, yellow bullhead (*Ameiurus natalis*), flat bullhead (*Ameiurus platycephalus*), bowfin (*Amia calva*), carp (*Cyprinus carpio*), and gizzard shad (*Dorosoma cepedianum*). A list of fish species common to Fort Gordon is provided in Appendix F.

2.3.4 Flora

2.3.4.1 Historical Vegetation

Historically, the installation landscape was dominated by longleaf pine forest, dissected by sluggish blackwater streams, seeps, swamps, and pocosins. The sandhill longleaf pine community is characterized by a scattered longleaf pine canopy. A variety of scrub oaks inhabit the understory and midstory, such as, scrub oak (*Quercus ilicifolia)*, blackjack oak, turkey oak, and post oak (*Quercus stellata*). Longleaf pine communities support a species rich groundcover of herbs and graminoids. The longleaf pine community is fire dependent and relies on fire to control midstory vegetation. Fire promotes the regeneration of both longleaf pine and herbaceous species.

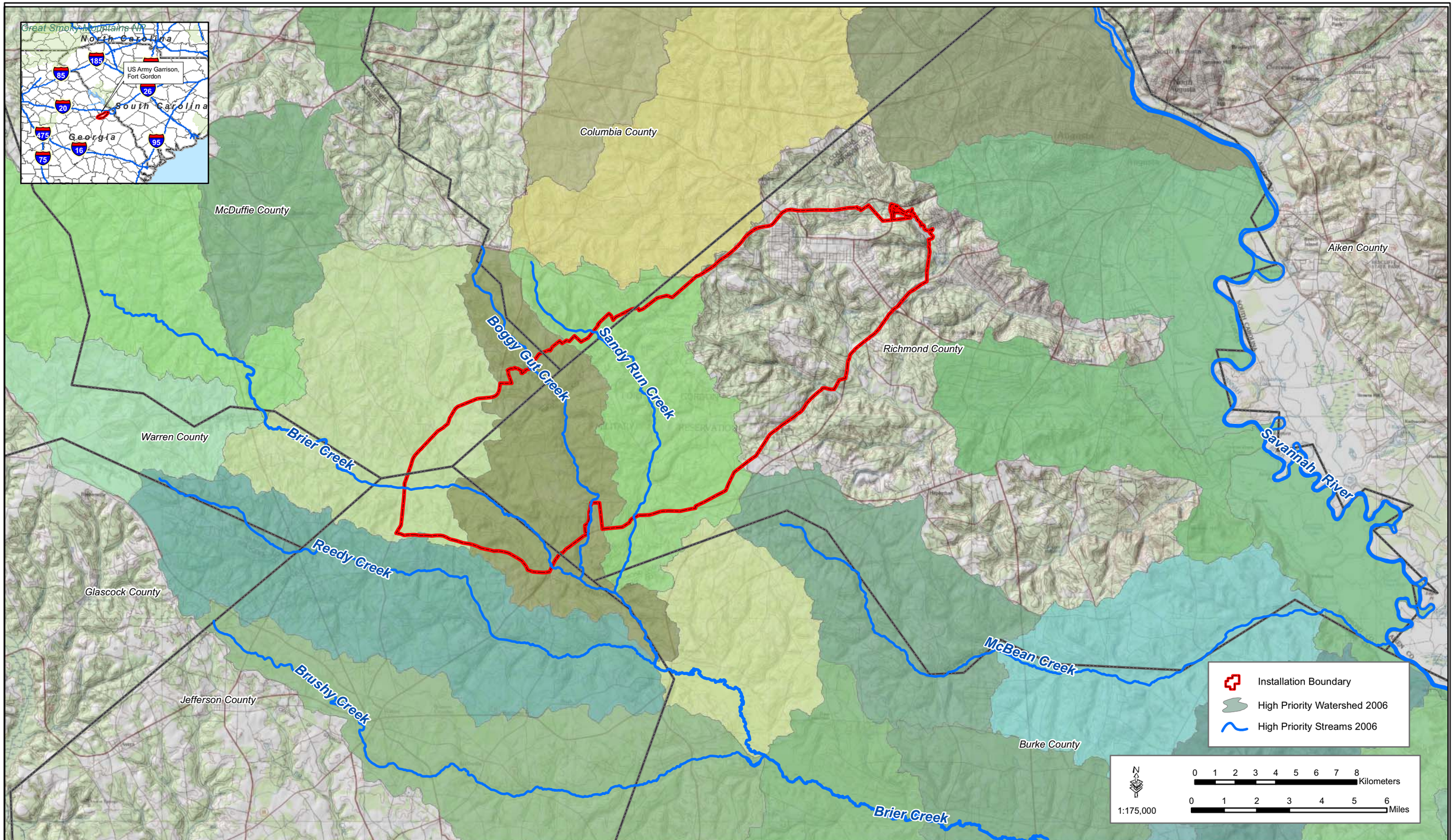

Figure 2-10: High Priority Watersheds and Streams

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Once the dominant tree species across approximately 56 million acres and ranging over an additional 36 million acres, longleaf pine now occupies less than approximately 1.8 million acres of intact pine/wiregrass habitat (Frost 1993). European settlement has resulted in a loss of more than 95 percent of the natural plant communities that comprised the original range of longleaf pine dominated ecosystems. Logging of the southeast forest during the period 1870 to 1920, removed nearly all of the original timber in the southeast (TNC 1993). Following the logging era, land uses such as agriculture, open range livestock grazing, logging, turpentine production, and the elimination of wildfires have contributed to the loss of longleaf pine communities. Large expanses of the original longleaf pine community range has been converted to off-site pine species such as loblolly pine and slash pine as a result of planting previously logged longleaf pine sites (Frost 1993). This is true on the installation where loblolly and slash pine occupy large expanses of historical longleaf pine habitat (Fort Gordon 2001).

2.3.4.2 Vegetation Classification

Fort Gordon exhibits a large variety of native vegetation characteristic of both the Upper Coastal Plain and Lower Piedmont Plateau physiographic provinces. The type of vegetation is dictated partially by elevation. The small and large scale topographic diversity between upland areas and streams forms a gradient of moisture conditions along slopes and vegetation types. Natural communities range from xeric, fire-prone uplands to moist bottomland swamp forest, subject to periodic flooding. Nearly 92 percent of the installation is in forest cover, of which 46,145 acres (83 percent) are managed forest. Common plant species on the installation include, but are not limited to, longleaf pine, loblolly pine, southern wiregrass (*Aristida stricta*), white oak *(Quercus alba),* hickory *(Carya* spp.*)*, dogwood (*Cornus florida*), blueberry (*Vaccinium* spp.), water oak (*Quercus nigra*), broomsedge (*Andropogon virginicus*). A detailed list of vegetation found on Fort Gordon is provided in Appendix F.

TNC and the Association for Biodiversity Information classified the ecological communities on Fort Gordon in 2000. Ecological communities were classified using the International Classification of Ecological Communities for Terrestrial Vegetation of the Southeastern U.S. Seven vegetation classes were identified on Fort Gordon. These classes include forest, woodland, shrubland, dwarf-shrubland, herbaceous vegetation, nonvascular vegetation, and sparse vegetation. The forest and herbaceous classes are further defined by subclass. Forest subclasses include evergreen forest, deciduous forest, and mixed forest and the herbaceous

vegetation class includes perennial graminoid vegetation, perennial forb vegetation, hydromorphic rooted vegetation, and annual graminoid or forb vegetation (Weakley, A.S., K.D. Patterson, S. Landeal, M. Pyne, R.E. Evans, J.A. Teague, M.J. Russo, *et al*., 2000). These vegetation classes are characterized by a wide variety of plant species (Appendix F).

The following sections describe the vegetation communities that have been identified on Fort Gordon. Table 2-7 provides a quantification of the area occupied by each vegetation community.

Table 2-7. Vegetation Communities Found on Fort Gordon

Vegetation Community	Area (acres)
Pine forest	27,795
Bottomland hardwood forest	3,891
Mixed Pine/hardwood forest	556
Pine plantation	10,562
Scrub oak	2,224
Pine/scrub	4,472
Grassland	556
Streamside forest	1,668

Fort Gordon 2001

Pine Forest

This is the most common plant community found on Fort Gordon and is located throughout the installation. It comprises approximately 50 percent of the installation land area. Dominant overstory species are loblolly pine, longleaf pine, shortleaf pine, and slash pine. Understory species consist of immature pines, honeysuckle (*Lonicera japonica*), scrub oak, sumac (*Rhus* spp.), and short grasses.

Bottomland Hardwood Forest

This plant community is common throughout the installation primarily in the bottomlands. Approximately 7 percent of the installation land area is inhabited by this plant community. Common species in the overstory are white oak, American beech (*Fagus grandifolia*), hickory, red maple (*Acer rubrum*), ash (*Fraxinus* spp.), blackgum, swamp chestnut oak (*Quercus michauxii*), willow oak (*Quercus stellata*), and yellow-poplar. The understory is medium to dense and consists of wax myrtle (*Myrica cerifera*), sumac, scrub oak, and honeysuckle.

Mixed Pine/Hardwood Forest

This plant community is found in scattered small tracts in the western portion of the installation. It occurs on approximately 1 percent of the installation land area. Dominant species include loblolly pine, sweetgum, yellow-poplar, and blackgum. Other species in the overstory includes longleaf pine, white oak and red oak (*Quercus falcata*). Undergrowth varies from medium to dense, consisting of honeysuckle, wax myrtle, sumac, and scrub oak.

Pine Plantation

This community is a result of reforestation practices on Fort Gordon. The planted pine plantation community occurs throughout the installation and comprises approximately 19 percent of the installation land area. This community is composed primarily of loblolly pine and slash pine. Understory vegetation consists of sumac, rhododendron (*Rhododendron* sp.), wax myrtle and short grasses.

Scrub Oak Community

This community inhabits approximately 4 percent of the installation land area and is comprised primarily of scrub oak. The scrub oak community is located throughout the installation; however the largest stands are in the SAIA. Other species associated with this plant community include blackjack oak, turkey oak, wax myrtle, honeysuckle, sumac, and short grasses.

Pine/Scrub Community

A large tract of this community is located in the AIA. Additionally, other small areas are scattered throughout the installation. This plant community inhabits approximately 8 percent of the installation. Dominant species in the overstory include longleaf pine, loblolly pine, shortleaf pine, scrub oak, blackjack oak, and turkey oak. Other species associated with this community are wax myrtle, greenbrier (*Smilax* spp.), sumac, honeysuckle, and short grasses.

Grassland

This community is isolated to a few areas near the central portion of the installation. It occupies approximately 1 percent of the installation land area. The grassland community at Fort Gordon consists of broomsedge, southern wiregrass, Johnson grass (*Sorghum halepense*), and crab grass (*Digitaria* sp.). Many other species of grasses, sedges, and composites also occur in this community. Grasslands develop in areas of food plots, clearings in forested areas and in the understory of open forest types.

Streamside Forest

This community is common on seasonal wetlands mainly along Brier Creek in the southwest portion of the installation. Approximately 3 percent of the installation land area is occupied by this community type. Dominant species include black willow (*Salix nigra*), river birch (*Betula nigra*), swamp cottonwood (*Populus heterophylla*), willow oak, and water oak. Understory species include greenbrier, honeysuckle, and alder (*Alnus* sp.).

2.3.5 Non-Native Species

Non-native species are plant and animal species that have become established outside their natural range as a result of intentional or unintentional introduction. Some of these species are more aggressive and prolific than native species and can have the potential to alter natural ecological process or replace native species. Non-native species known to occur on Fort Gordon include kudzu (*Pureria montana* var. *lobata*), weeping lovegrass (*Eragrostis curvula*), privet (*Ligustrum sinense*), bamboo (*Phyllostachys aurea*), and red fire ants (*Solenopsis invicta*). The need for control depends on the effect of non-native species on native species, their ability to colonize new sites, and their potential to spread within sites. Control of these species should be determined on a case by case basis.

Kudzu is an example of a non-native species that is very aggressive and interferes with installed facilities such as utility poles, and progressively encroaches upon valuable woodland species and habitats. The species was originally planted to control erosion, which was unsuccessful, and in recent years the DPWL and Forestry Section have initiated a program to eradicate kudzu from Fort Gordon. This program is discussed in detail in Section 4.9 (Pest Management) of this document.

2.3.6 Poisonous Plants

Poison ivy and poison oak are the only poisonous plants of any impact on humans that are present in large quantities. These plants are very common members of the natural plant communities of the southeast, and can seriously affect sensitive people. Although these plants seldom occur in the immediate cantonment area or heavily maintained locations, they are eliminated physically or chemically when they do occur. There is no program attempting to eliminate these species from the entire training environment, as this would be cost-prohibitive and serve no real purpose.

3.0 ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

3.1 SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT

Sustainability is defined as the ability to provide for the needs of the current mission without damaging the ability of future missions to maintain their needs. When a process is sustainable, it can be carried out over and over without any negative environmental impacts or impossible high costs to anyone involved.

The NRB is a participant in the Sustainability Management System (SMS). This process allows an organization to control the impact of its activities, products, or services on the natural environment, allowing it to not only achieve and maintain compliance with current environmental requirements, but to recognize and proactively manage future issues that might impact mission sustainability.

Fort Gordon's Natural Resources Branch staff assist in the implementation of the Installation's ITAM Program, Forest Management Plan, and Recreation Plan, implement timber sales, and provide measures for water quality improvement in support of the sustainability of the military mission.

Monitoring and measurement is fundamental to adaptive management and mission sustainability. It ensures the effectiveness of the management, plans, controls, and training. Furthermore, it enables Fort Gordon to identify its progress toward achieving objectives and targets, and the reasons for the installations level of achievement. Without effective monitoring and measurement it would be impossible for Fort Gordon to continually improve, which is the basis of sustainability.

3.1.1 Integrate Military Mission and Sustainable Land Use

The U.S. Army's ITAM is an integral part of the implementation of an INRMP on an installation. The ITAM is a comprehensive approach to land management on all U.S. Army installations. It is the U.S. Army's standard for sustaining the capability of installation land units to support their military training missions. The goals of the ITAM include the following:

- Achieve optimal sustained use of lands for the execution of realistic training, by providing a sustainable core capability, which balances usage, condition, and level of maintenance.

- Implement a management and decision-making process which integrates U.S. Army training and other mission requirements for land use with sound natural and cultural resources management.
- Advocate proactive conservation and land management.
- Align U.S. Army training land management priorities with U.S. Army training, testing, and readiness priorities.

Through the ITAM and it's constituent elements (*e.g.*, LCTA and LRAM) Fort Gordon integrates the use of it's lands for meeting the current and future military mission and ensuring the conservation of the natural resources on which effective training rely.

3.1.2 Define Impact to the Military Mission

The military mission at Fort Gordon requires available land for the training of military units. However, the installation must comply with environmental regulations and strive to conserve the natural resources on which effective training rely. Through the coordination of the various environmental programs (*e.g.,* Forest Management, Fish and Wildlife Management) and the ITAM, Fort Gordon ensures the availability of quality training lands and the protection of the natural resources on these lands. During the planning phase of natural resources or training management the NRB and DPTMS's ITAM Coordinator closely coordinate to ensure the compatibility between the military mission and training requirements, and natural resources. During this planning process, resolutions are established to ensure environmental regulations (*e.g.,* ESA) are being satisfied while still providing sufficient land use to meet the military mission. For example, the signal training that occurs on Fort Gordon has a low impact to the environment. Signal units may train in TAs with a RCW cluster as long as only activities authorized by the 2007 U.S. Army Management Guidelines for the Red-cockaded Woodpecker on Army installations (Army 2007) occur with the 200-foot buffer around an active RCW cavity tree. Further, the NRB coordinates all natural resources management activities with DPTMS's Range Control to ensure there is no conflict with military training.

3.1.3 Describe Relationship to Range Complex Management Plan or Other Operational Area Plans

Through the INRMP, planning for both training activities and natural resources activities are coordinated between DPWL and DPTMS. This ensures the military mission is not compromised and Fort Gordon is meeting the mandated environmental regulatory

requirements. Through ITAM, environmental resources are considered during the planning of future sites to support the military mission. Additionally, the NRB considers future range plans when developing natural resources projects, such as establishing a recruitment cluster for the RCW.

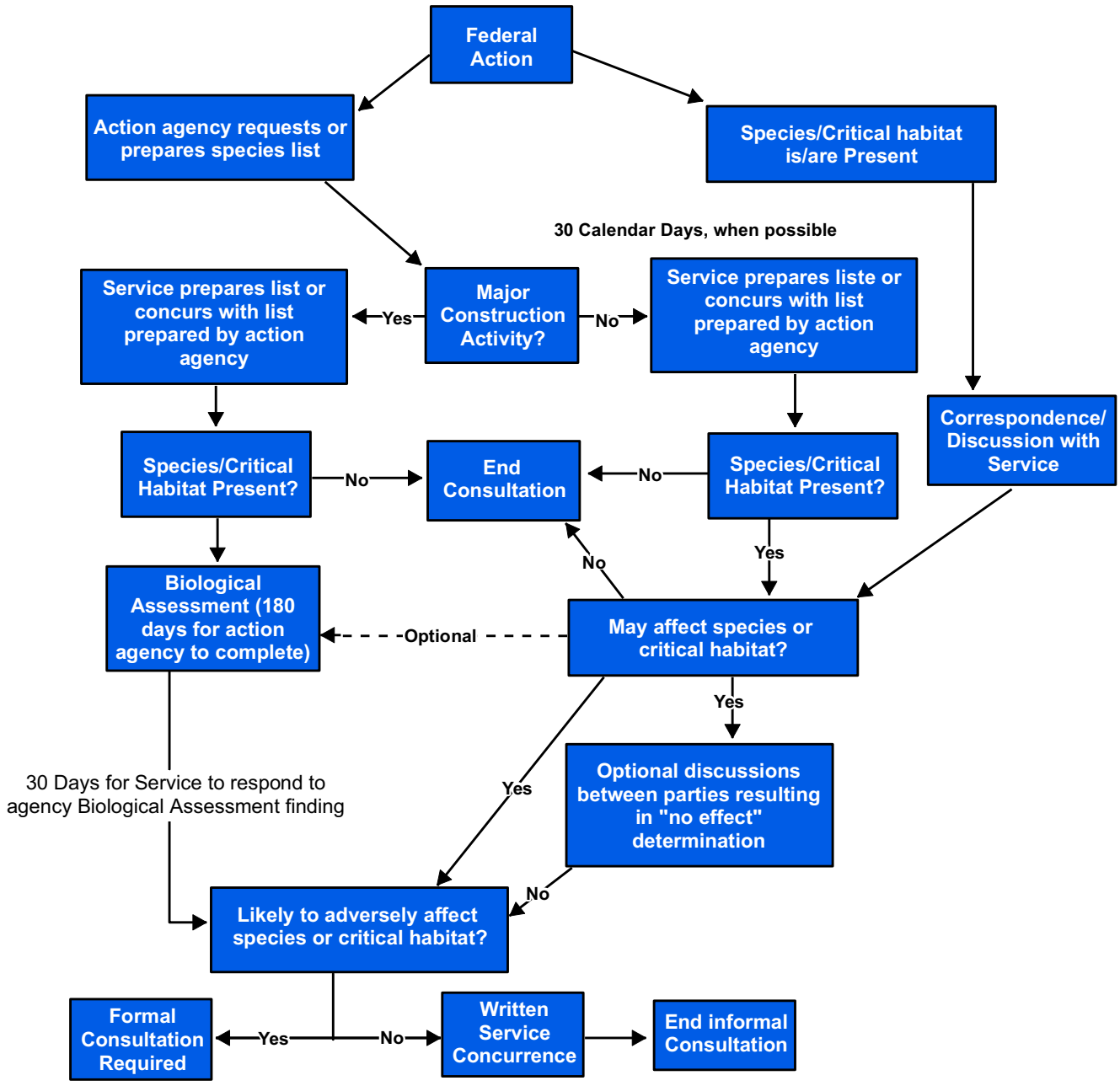
3.2 NATURAL RESOURCES CONSULTATION REQUIREMENTS

The ESA, requires Federal agencies to ensure that their activities do not have an adverse impact on any species listed as threatened or endangered by the USFWS. It further requires that Federal agencies implement measures to conserve, protect, and, where possible, enhance any listed species and its habitat.

Fort Gordon coordinates with USFWS on any actions that have the potential to impact threatened, endangered, and sensitive species. The installation maintains a dialogue with USFWS and conducts numerous informal Section 7 consultations every year. Early informal consultation with the USFWS is the key to resolving potential problems, and addresses issues in a proactive and positive manner and is the preferred method of consultation. Informal consultation includes all discussions and correspondence between USFWS and Fort Gordon and occurs prior to formal consultation to determine whether a proposed Federal action may affect listed species or critical habitat. In addition to this INRMP, projects that are currently planned and will require informal consultation with USFWS include, the expansion of a high voltage transmission line right of way, convoy live fire range construction and operation, construction of a machine gun range in TA 46, and construction of the Non-Commissioned Officer Academy (NCOA) Tactical Training Base. A flow chart of the informal consultation process is provided in Figure 3-1.

Fort Gordon works closely with USFWS to ensure the installation is in compliance with the ESA.

Fort Gordon may determine, through the informal consultation process or simply by the nature of the proposed action, that formal consultation is required for an action. If Fort Gordon determines that an activity may have an affect upon a listed species, the installation is required under Section 7 of the ESA, to enter into formal consultation with USFWS to determine whether a proposed action is likely to jeopardize the continued existence of listed species, destroy or adversely modify designated critical habitats, or potentially result in the incidental take of a species.



Source: USFWS 1998

Figure 3-1: Organizational Chart for Informal Consultation Process

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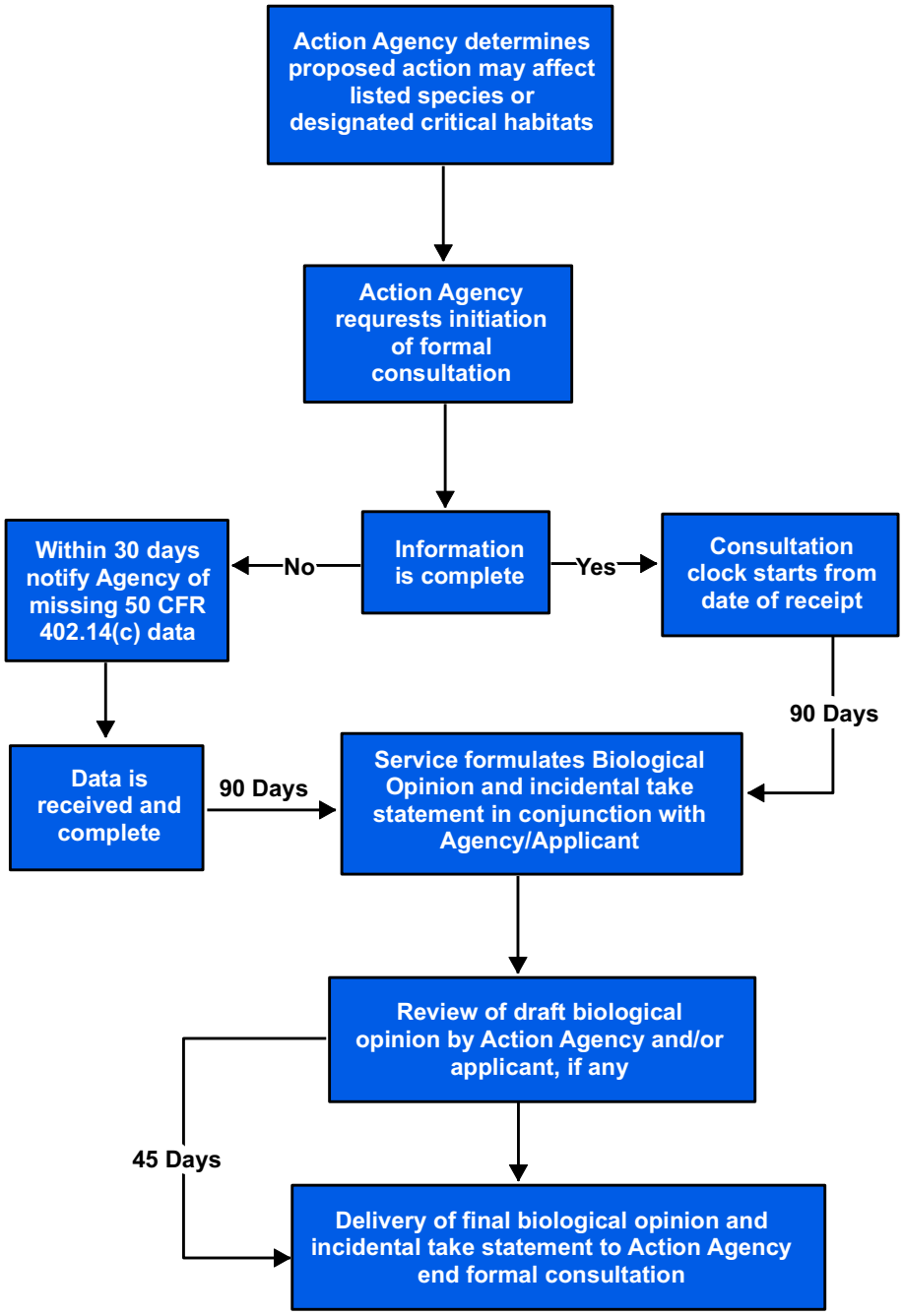
The consultation process begins with Fort Gordon's written request and submittal of a complete initiation package and concludes with USFWS's issuance of a biological opinion (BO) and "incidental take" statement, if applicable. The ESMC of this INRMP, due to the potential for management actions to result in the incidental take of a RCW will require development of a biological assessment and formal consultation with the USFWS. Currently there are no other known projects on Fort Gordon that should require formal consultation. A flow chart detailing the steps of the formal consultation process is shown at Figure 3-2.

Migratory birds are specifically protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended and Executive Order (EO) 13186 of January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds. The MBTA makes it illegal to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products, except as allowed by the implementing regulations. EO 13186 requires that Federal agencies avoid or minimize the impacts of their activities on migratory birds and make efforts to protect birds and their habitat. However, military preparedness and readiness activities such as signal training are exempt from the MBTA. Although exempt, the U.S. Army is responsible for monitoring the potential impacts to migratory birds from military readiness activities. This monitoring will be carried out in conjunction with monitoring and management conducted under EO 13186 as specified in the Memorandum of Understanding between the DoD and the USFWS to Promote the Conservation of Migratory Birds dated 31 July 2006, and in DoD Guidance to implement said memorandum dated 3 April 2007.

3.3 NEPA COMPLIANCE

The National Environmental Policy Act (NEPA) of 1969 (42 USC 4371 *et seq*.) is the basic National charter for the protection of the environment. The NEPA established the policy, sets goals, and provides means for carrying out the policy. Federal agencies' actions must comply with the NEPA. The NEPA requires that all Federal agencies involve interested members of the public in their decision-making, consider reasonable alternatives to proposed actions, develop measures to mitigate environmental impacts, and prepare environmental documents which disclose the impacts of proposed actions and alternatives.



Source: USFWS 1998

Figure 3-2: Organizational Chart for Formal Consultation Process

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Fort Gordon actively incorporates environmental considerations into informed decision-making, in a manner consistent with NEPA and Army regulations (32 CFR Part 651; Environmental Analysis of Army Actions). Communication, cooperation, and, as appropriate, collaboration between government and extra-government entities is an integral part of Fort Gordon's NEPA process. While carrying out this mission, the NEPA program also encourages the wise stewardship of natural and cultural resources for future generations. Fort Gordon decision makers are cognizant of the impacts of their decisions on cultural resources, soils, forests, rangelands, water and air quality, fish and wildlife resources, and other natural resources under their stewardship, and, as appropriate, in the context of regional ecosystems (32 CFR Part 651).

Fort Gordon continuously takes steps to ensure that its NEPA compliance program is effective and efficient. Early integration of the NEPA process into all aspects of Fort Gordon planning prevents disruption in decision-making and ensures that NEPA supports Fort Gordon's planning process and leads to sound decisions. All NEPA analyses are prepared by an interdisciplinary team. When necessary, partnering or coordinating with agencies, organizations, and individuals who have specialized expertise will improve the NEPA process.

Most projects reviewed under the Fort Gordon NEPA program enter the process through the submission of a work request document (DA4283). A member of the NEPA staff attends a weekly meeting to review all new work requests submitted. Other actions such as MCA construction, military field training exercises, and plans like the INRMP or Integrated Cultural Resources Management Plan (ICRMP) also undergo NEPA review. On average Fort Gordon reviews approximately 600 projects annually that results in 596 categorical exclusions and four environmental assessments (EA). Project reviews, comments, requirements and the administrative records are tracked and recorded in a database maintained by the NEPA program managers.

3.3.1 Public Involvement

The involvement of other agencies, organizations, and individuals in the development of EAs and Environmental Impact Statements (EISs) enhances collaborative issue identification and problem solving. Such involvement demonstrates that Fort Gordon is committed to open decision-making and builds the necessary community trust that sustains Fort Gordon in the long-term. Public involvement is mandatory for EISs (see 32 CFR part 651.47). However, Fort Gordon is only required to involve environmental

agencies and the public to the extent practicable in the preparation of an EA.

When considering the extent practicable for public interaction (40 CFR 1501.4(b)), factors to be weighed include:

(1) Magnitude of the proposed project/action.
(2) Extent of anticipated public interest, based on experience with similar proposals.
(3) Urgency of the proposal.
(4) National security classification.
(5) The presence of minority or economically-disadvantaged populations.

EAs, Findings of No Significant Impact (FNSI) and documents incorporated by reference are available for public review. To inform the public when documents are available for review and comment, a Notice of Availability (NOA) is placed in the legal section of the *Augusta Chronicle* newspaper. Copies of documents are made available at the Main Augusta Public Library, the Fort Gordon PAO and the Environmental Division, and are posted on the World Wide Web. All NOAs contain a point of contact and address where the public can obtain more information, ask questions, or send comments on the proposed project.

3.4 BENEFICIAL PARTNERSHIPS AND COLLABORATIVE RESOURCE PLANNING

3.4.1 U.S. Fish and Wildlife Service

The USFWS has a field office at Athens, Georgia which provides technical advice to Fort Gordon for the management of natural resources, particularly Federally protected species. Army Regulation 200-1 provides cooperative guidance to be followed by installations with the USFWS regarding endangered species management on U.S. Army installations.

The USFWS is a signatory cooperator in the implementation of Fort Gordon's Fish and Wildlife program in accordance with the Sikes Act. Appendix C contains specific items of agreement among the USFWS and Fort Gordon, as required by the Sikes Act.

3.4.2 Georgia Department of Natural Resources

The State of Georgia, acting through the Director, GADNR, provides limited technical advice and assistance if funds are available and priority warrants. The Wildlife Resources Division is

the primary support division within GADNR for assisting with the implementation of Fort Gordon's Fish and Wildlife program. Much of this support has been in fisheries. GADNR supplies some fish for stocking of lakes on Fort Gordon.

Fort Gordon and GADNR have entered into an annual agreement to sponsor Kid's Fishing Events as part of National Fishing Week. The state provides catfish under the condition that Fort Gordon feeds the fish and opens the designated pond for the fishing event. This will be an annual event as long as both parties desire to hold the event.

3.4.3 Georgia Forestry Commission

Under the terms of a mutual aid agreement for forest fire fighting, entered into between Fort Gordon and the Georgia Forestry Commission (GFC), DPWL may furnish fire equipment and personnel to assist adjacent county forestry units. All DPWL fire fighting units operating off-post will remain under the control of the installation forester, or his designated representative, who will accompany all such units when they leave Fort Gordon. The Fire Marshal and Garrison Commander will be notified when a request from off-post is received, and kept informed of the situation while installation personnel and equipment are so committed. Direct control action will be taken by Fort Gordon forestry personnel against any wildfire that threatens or is a potential danger to government property, even though the fire is on private property. DPWL will be kept advised of all off-post activities involving U.S. Army personnel and equipment. A copy of the mutual aid agreement is included as an appendix to the Forest Management Plan.

3.4.4 Conservation Organizations

Fort Gordon has an on-going partnership with TNC to assist with a variety of projects, including identification and mapping of vegetation communities and implementation of monitoring protocols. Additionally, Fort Gordon has initiated work efforts with the Central Savannah River Land Trust.

Fort Gordon has partnerships with several wildlife conservation organizations. The installation has been a long-time recipient of funding from the National Wild Turkey Federation for the improvement of turkey habitat on the installation. In addition, Fort Gordon has received materials from Ducks Unlimited and Quail Unlimited to support habitat management for waterfowl and quail populations and Fort Gordon has a partnership with Waterfowl USA

for management of waterfowl (*i.e.*, wood duck boxes) on the installation.

3.4.5 Universities

Fort Gordon has cooperative agreements with several in-state higher education institutions for the conduct of research and studies on the installation. Additionally, Fort Gordon finds it necessary to hire additional sources of temporary labor to assist in the completion of some projects. The installation hires interns from universities to help fulfill temporary staffing requirements. The Student Conservation Association is another source of temporary employees. The following institutions cooperate with and assist Fort Gordon:

- Georgia Southern University
- Augusta State University
- Georgia Military College
- University of Georgia

3.4.6 Directorate of Plans, Training, Mobilization and Security

The DPWL cooperates with the DPTMS through the ITAM program to ensure the sustainability of land use for the military mission and protection of the environment, including threatened and endangered species. The ITAM program requires an ecosystem approach to protecting and managing threatened and endangered species with the least impact to training. Fort Gordon's ITAM program incorporates conservation measures to protect the RCW. Field training exercises and natural resources management activities are closely coordinated between DPTMS and DPWL to prevent adverse impacts to the RCW and other sensitive natural resources. Additionally, the ITAM program promotes environmental awareness, including the education of officers and enlisted troops to foster wise use of the land. Fort Gordon's NRB provides environmental awareness training, including conservation of sensitive species, to military personnel training on Fort Gordon.

Through the ITAM program, the NRB participates in the LCTA to inventory and monitor natural resources. These inventories and monitoring allows the DPWL and DPTMS to document the condition of natural resources and assess the ability of the land to withstand impacts from training.

3.4.7 Oak Ridge Institute for Science and Education

Through Oak Ridge Institute for Science and Education (ORISE), the U.S. Department of Energy's (DoE) Work for Others (WFO)

program allows DoE personnel or DoE contract personnel to perform work for non-DOE entities when the work is not directly funded by DoE. This program allows other Federal agencies to accomplish goals that otherwise be unobtainable. Fort Gordon participates in the WFO program to meet temporary manpower requirements for natural resources management. Currently, the Forestry Section has two forestry technicians from the WFO program on staff.

3.5 PUBLIC ACCESS AND OUTREACH

3.5.1 Public Access and Outdoor Recreation

With the rapid increase in the human population, surrounding development and the decrease of private lands available for outdoor recreation, there is more demand than ever on public lands like Fort Gordon. Therefore, Fort Gordon, GADNR, and other conservation organizations will continue to work together to meet the increasing demands on Fort Gordon's limited resources.

AR 200-1 states "that installations where feasible will provide recreational access to these lands for the purpose of hunting, fishing, and trapping. Army lands with suitable natural resources will be managed to allow for outdoor recreational opportunities." The Fish and Wildlife Section strives to manage the resources on Fort Gordon for these opportunities within the constraints of the military mission. Fort Gordon allows hunting and fishing in most TAs; however, some areas are restricted for safety reasons (*i.e.*, impact areas) or their location near a permanent training site or the cantonment area. Seasons and bag limits are set by the Fish and Wildlife Section and coordinated with the GADNR. Seasons and bag limits usually follow those set by the State of Georgia or the USFWS for waterfowl.

The Sikes Act Cooperative Agreement with GADNR provides access to natural resources on Fort Gordon by the general public through an annual lottery. Members of the general public can submit an application to GADNR between 1 and 15 May each year. GADNR is responsible for drawing the applicants from this lottery

and providing Fort Gordon's Fish and Wildlife Section a list of the selected individuals. Fort Gordon's Fish and Wildlife Section will send a letter to the first 250 individuals stating that they have been selected and have approximately 30 days to purchase their license. If after the 30 day period all 250 licenses have not been sold, then another list is generated by GADNR and letters sent out with the same 30 day requirement. This process is repeated until 250 licenses have been sold. The Fort Gordon Fish and Wildlife Section will notify these individuals and provide them with necessary information. These selected individuals will be eligible to receive hunting, fishing and horseback riding privileges for one year from date of purchase. Complete information about public access can be found in Section 4.13 (Outdoor Recreation) and Section 4.4 (Fish and Wildlife plans).

All hunters and fisherman are required to sign in and out of areas open for recreational use on a daily basis. There are several sign in boards for hunting and fishing on Fort Gordon. The sign in board at 15th Street may only be used for fishing and archery sign in. The remaining sign in boards are in TA 49, TA 48 and the Game Wardens office. Upon signing out, a harvest card must be completed if game was taken.

3.5.2 Public Outreach

To increase the awareness of the importance of ecosystem management, Fort Gordon fosters citizen participation in ecosystem education and stewardship, and participates in regional stewardship/research programs. This has included educational activities with local organizations such as local Boy Scout troops, environmental groups, conservation clubs, and school groups. The NRB participates in several educational and safety events throughout the year. At the Sandy Run Nature Trail, approximately 2,000 school children are given tours and talks on the value of wildlife and activities that occur on Fort Gordon annually. The military units on Fort Gordon request and are given safety briefings on poisonous plants and animals that may be encountered during field exercises and how to handle such encounters. Approximately 2,000 soldiers are trained annually. The NRB also sets up information displays at events such as earth day, school career days, and stand up safety day. Arrangements for guided tours of the nature trail or presentations are made through DPTMS and the PAO. Contact the NRB for scheduling procedures.

In addition, Fort Gordon participates in the Environmental Science Education Cooperative and events hosted by conservation

organizations like the National Wild Turkey Federation's Jakes and Ducks Unlimited's Green Wings.

Further, as previously mentioned in Section 3.4.2, Fort Gordon and GADNR have entered into an annual agreement to sponsor Kid's Fishing Events as part of National Fishing Week.

3.6 ENCROACHMENT PARTNERING

Fort Gordon completed a Joint Land Use Study (JLUS) in August of 2005 (Fort Gordon 2005). As a result of this study the four counties that Fort Gordon occupies have agreed to direct development in ways that should allow Fort Gordon's mission to continue without conflicts with land use outside the installation. In addition, in 2007 Fort Gordon began development of an ACUB proposal. Implementation of a comprehensive ACUB program would prevent encroachment that would disrupt, limit, or diminish training capabilities and as a secondary benefit, protect key natural habitats, ecological systems, and associated wildlife and vegetation. Under the authority provided in Section 2811, National Defense Authorization Act of 2003 (codified at 10 United States Cod Sec. 2684a), Fort Gordon proposes to enter into a cooperative agreement with Central Savannah River Land Trust (CSRLT) and other partners in order to direct the goals, implementation, and administration of the ACUB partnership. Other potential partners include USFWS, TNC, GADNR, Natural Resources Conservation Service (NRCS), and Central Savannah River Area, Regional Development Center. Fort Gordon and its primary partner, CSRLT, have identified priority areas surrounding the installation in which to acquire conservation easements under the ACUB program. Those properties that have high conservation values such as, wetlands; GADNR high priority streams; watersheds; species of concern; *etc*, provide the opportunity for the Army to protect its mission on-post by conservation of high quality natural areas off-post.

Encroachment partnering allows Fort Gordon to proactively address encroachment issues to ensure future training and mission development with minimal impacts from outside the Installation's boundaries.

3.7 STATE COMPREHENSIVE WILDLIFE PLANS (SCWP)

In December 2002, the Wildlife Resources Division (WRD) of GADNR began a process to develop a comprehensive wildlife conservation strategy. Through the Wildlife Conservation and Reinvestment Program, WRD made a commitment to develop and initiate implementation of this comprehensive wildlife conservation strategy by 1 October 2005. Funding for this planning effort came

from a Federal grant to WRD through the State Wildlife Grant program; matching funds were provided through Georgia's Nongame Wildlife Conservation Fund. The goal of the strategy is to conserve Georgia's animals, plants, and natural habitats through proactive measures emphasizing voluntary and incentive-based programs on private lands, habitat restoration and management by public agencies and private conservation organizations, rare species survey and recovery efforts, and environmental education and public outreach activities.

3.7.1 Southeastern Plains Ecoregion

Fort Gordon is located in the Southeastern Plains ecoregion which stretches across middle and southwestern Georgia, covering approximately 16,252,663 acres. It is bordered on the northwest by the Piedmont and on the southeast by the Southern Coastal Plain. The northwestern edge of this ecoregion is known as the Fall Line, a distinctive zone of transition between the topographically varied Piedmont and the relatively flat Coastal Plain. Approximately 426,775 acres are in permanent or long-term conservation ownership. GADNR manages approximately 116,308 acres owned in fee simple by the State of Georgia and an additional 63,838 acres in leases or management agreements. Federal land ownership includes approximately 288,300 acres managed by DoD, 14,050 acres managed by USFWS, 3,072 acres managed by NRCS, and 1,148 acres managed by National Park Service. While this ecoregion is the largest in the state, it has the lowest percentage of lands in permanent conservation status (2.6 percent).

This expansive ecoregion of irregular plains and broad interstream areas contains a mosaic of cropland, pasture, woodland, and forest. Natural vegetation is mostly longleaf pine-wiregrass, longleaf pine-scrub oak, oak-hickory-pine and southern mixed forest. Geologic strata of this region are of Cretaceous or Tertiary age. Elevations and relief are generally less than in the Piedmont and greater than in the Southern Coastal Plain. Streams in this region have relatively low gradients and sandy substrates. Subdivisions of the Southeastern Plains in Georgia include the Sand Hills, the Southern Hilly Gulf Coastal Plain, the Dougherty Plain, the Tifton Upland, the Sand Hills, the Tallahassee Hill/Valdosta Limesink, and the Southeastern Floodplains and Low Terraces.

The Sand Hills are a narrow, rolling to hilly, highly dissected belt stretching across the state from Augusta to Columbus. The region is composed primarily of Cretaceous and Eocene marine sands and clays deposited over the crystalline and metamorphic rocks of

the Piedmont. Soils are mostly excessively well drained and low in nutrients, although soils in some areas contain more loamy and clayey horizons. The driest sites have typical sandhill vegetation characterized by longleaf pine and turkey oak. Other areas have shortleaf-loblolly pine forests or mixed oak-pine forests. Atlantic white-cedar swamps can be found in a few areas in the western portion of the Sand Hills region.

The Longleaf Pine Ecosystem

Longleaf pine forests and savannas once covered approximately 92 million acres across the Southeast. Today, less than 3 percent of this habitat remains, and what is left is being lost at an estimated rate of 100,000 acres per year. In the last 30 years alone, longleaf pine acreage in North Florida has declined by 84 percent. Rangewide, longleaf pine-dominated ecosystems support more than 300 globally imperiled species; the steady decline in abundance and health of this habitat is thus linked with increasing imperilment of these species. Longleaf pine-wiregrass savannas and embedded wetlands comprise some of the most biologically diverse natural communities in North America. In Georgia, most of the remaining longleaf pine habitat is found on military bases or on quail plantations and other large privately owned tracts in the Red Hills and lower Dougherty Plain. Throughout its former range, the longleaf pine ecosystem is being impacted by forest conversion, fire suppression, habitat fragmentation, and invasive exotics species.

Several organizations, including the Longleaf Alliance, TNC, the Georgia Wildlife Federation, Tall Timbers Research Station, Georgia Forestry Commission, Joseph Jones Ecological Research Center and GADNR have focused research, education, and conservation efforts on this globally significant ecosystem. In addition to protecting high priority sites through fee-simple ownership or conservation easements, ongoing efforts include promotion of prescribed fires, providing technical guidance to private landowners wanting to reforest with longleaf pine, developing educational materials explaining the significance of this habitat, and conducting field research on ecosystem functions and restoration techniques. A number of private landowners and forestry consultants have been instrumental in efforts to restore and maintain habitat quality in the longleaf pine ecosystem.

3.7.2 High Priority Sites and Landscape Features

The current assessment and previous conservation planning efforts have identified a number of ecologically important sites and landscape features in this region of the state. An assessment of the East Gulf Coastal Plain conducted by TNC in cooperation with state

natural heritage programs in Alabama, Georgia, Florida, Mississippi, and Louisiana identified 15 high priority areas of conservation interest in Georgia (TNC 1999). A similar assessment conducted for the South Atlantic Coastal Plain in cooperation with state natural heritage programs in Georgia, Florida, and South Carolina identified 38 high priority conservation areas in Georgia (The Nature Conservancy, 2002). Field surveys conducted by GADNR staff and others have brought additional areas of conservation interest to light in recent years. Fort Gordon is included on the list of some of the most significant sites and landscape features identified to date for the Southeastern Plains ecoregion.

Specifically the Georgia State Wildlife Comprehensive Plan states:

> *Fort Gordon located in the upper portion of the Southeastern Plains south of Augusta; this military facility contains significant examples of longleaf pine-scrub oak woodland, longleaf pine/wiregrass savannas, Atlantic white cedar swamps, mesic hardwood forest, and blackwater streams. Rare species known from this conservation area include sandhills rosemary, Pickering's morning glory, Carolina redtop, sweet pitcherplant, red cockaded woodpecker, bluebarred pygmy sunfish, dwarf waterdog, and southern hognose snake.*

4.0 PROGRAM ELEMENTS

4.1 THREATENED AND ENDANGERED SPECIES MANAGEMENT AND SPECIES BENEFIT, CRITICAL HABITAT, AND SPECIES OF CONCERN MANAGEMENT

As part of the 5-year review and update of the INRMP, Fort Gordon revised the Ecosystem-based Endangered Species Management Plan (EESMP) and prepared the ESMC. This ESMC will guide natural resources management on Fort Gordon and will be implemented as part of the INRMP. The objective of the ESMC is to conserve Federally threatened and endangered species as required by the ESA while preserving training readiness and other mission requirements on Fort Gordon. Section 7 of the ESA requires Fort Gordon to carry out a program for the conservation of Federally protected species. Federal properties are required to employ all methods and procedures necessary to bring the Federally protected species to the point where ESA measures are no longer necessary. The RCW is the only Federally threatened or endangered species that is a resident of Fort Gordon, therefore, the RCW is the focus of Fort Gordon's ESMC. However, the ESMC does provide guidance for target species other than the RCW on Fort Gordon. These species are discussed in Section 4.1.16. Currently, there are no critical habitat designations on Fort Gordon (Appendix G).

The RCW is the primary focus of the ESMC.

Fort Gordon's current RCW population is small and vulnerable to extirpation. Currently there are 15 active and five recruitment clusters in the Habitat Management Unit (HMU) and two recruitment clusters in the SAIA, which is a direct fire area not included in the HMU under this plan (Figure 4-1). To avoid decline of this population and to remain in compliance with the ESA, appropriate management efforts need to be successfully implemented in the next few years.

The intent of the ESMC is to (1) present information on the RCW; (2) define conservation goals; and (3) outline a plan for management of the RCW and its habitat that will enable achievement of conservation goals. Cost of conservation efforts and impacts to other installation activities are discussed Section 5.0.

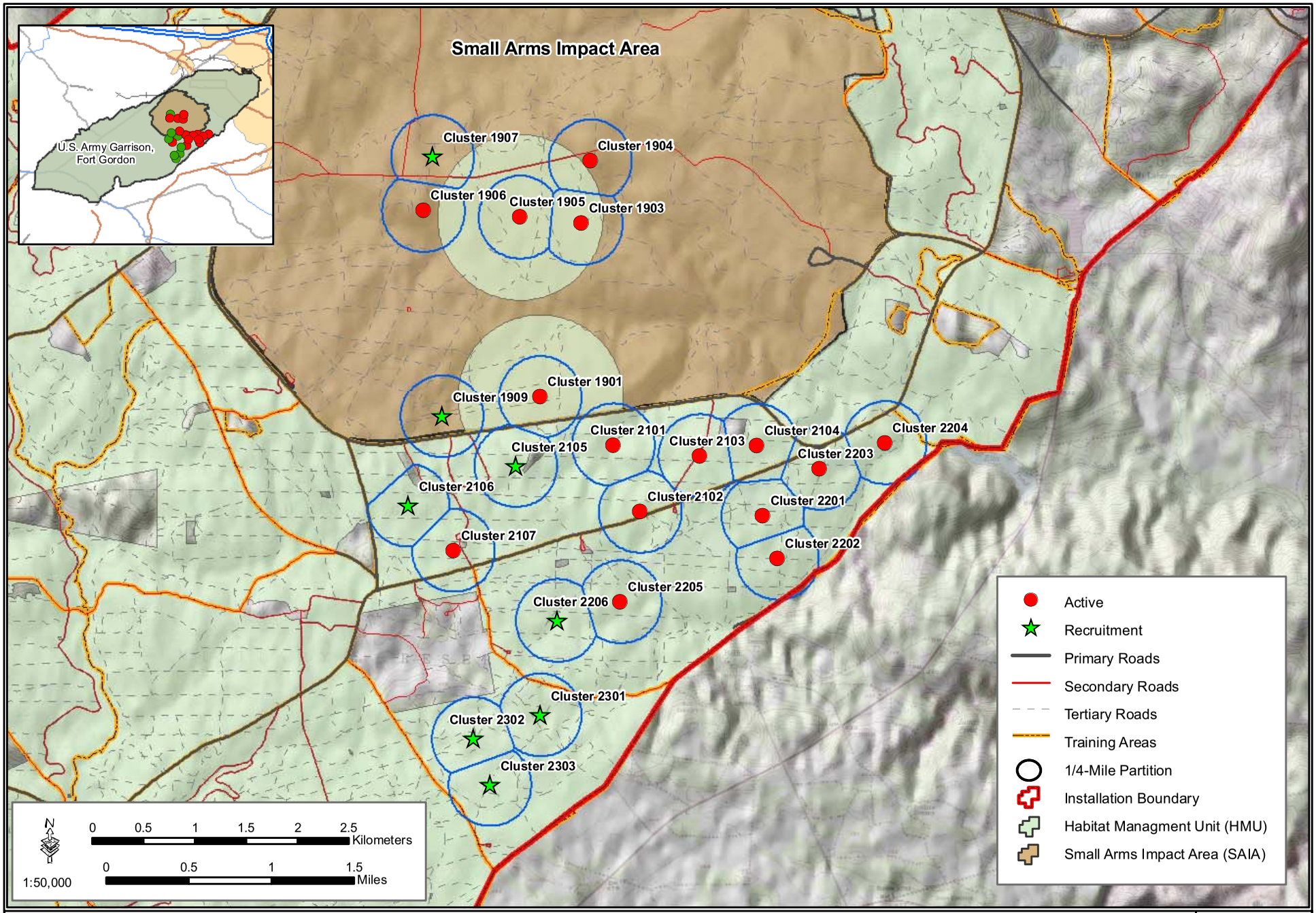

Figure 4-1: Active and Recruitment RCW Trees by Cluster, Fort Gordon, Georgia

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The management goals of the ESMC cover a 5-year period. Annual updates will continue to make the plan a working document. Current goals for this planning period will be modified as needed. A new ESMC will be developed when a significant change occurs in Fort Gordon's training mission, management techniques are generally outdated, or other changes render the current plan obsolete. Significant changes to the ESMC will require consultation with the USFWS.

The ESMC attempts to design a HMU that will remain intact for the long-term. The objective is to establish an area where RCW habitat can be maintained indefinitely. This approach is necessary because long periods are needed to develop suitable RCW habitat; however, the HMU is designed with knowledge only of short-term land-use requirements. The boundaries of the HMU are considered long-term but subject to change due to changing circumstances, changing missions, or new scientific information. Significant changes to the HMU will require consultation with the USFWS.

4.1.1 Army Guidance Used to Develop the ESMC

The Department of the Army provides two primary resources for developing an ESMC for RCW: the 2007 Management Guidelines for the Red-cockaded Woodpecker on Army Installations (Appendix H), hereafter referred to as the Guidelines and Chapter 4-3 of AR 200-1.

4.1.2 Coordination with Other Agencies and Individuals

The ESMC was developed in cooperation with USFWS and GADNR. The population goal was developed with guidance from USFWS. Representatives from USFWS and GADNR attended two meetings to assist in plan development and provided information during many consultations in person or by phone.

Management actions in the ESMC and military training activities on Fort Gordon have the potential to affect the RCW. Fort Gordon has determined these activities may affect, but are not likely to adversely affect the RCW. Therefore, Fort Gordon has prepared a biological assessment analyzing potential effects to the RCW from implementation of the ESMC and has requested formal consultation for the RCW with USFWS. As part of formal consultation under Section 7 of the ESA, Fort Gordon has requested incidental take of the RCW for management and training activities (see Section 4.1.9.2).

4.1.3 Species Information

The RCW is endemic to old growth pine forests of the southeastern U.S. Within its range, RCW is most commonly associated with longleaf pine, although it can be found in other pine habitats, including loblolly, shortleaf (*P. echinata*), and slash pines. Under optimum conditions these forest stands contain mature pine with an open canopy, low densities of small pines, little or no hardwood or pine midstory, limited hardwood overstory, and abundant native bunchgrass and forb groundcovers.

RCWs are unique among woodpeckers in that they excavate cavities in living pine trees. The excavation process can take several years to complete (Copeyon 1990); however, cavities are subsequently used for roosting and nesting. The minimum age of pines selected for cavity trees is approximately 60 to 70 years and minimum diameter at breast height (DBH) is typically 15-18 inches (USFWS 1985).

RCWs exist as "families", and are referred to as groups or clusters. Groups normally consist of a breeding pair, helpers (usually male offspring of one or both of the breeding pair from previous years), and the current year's offspring. Helpers excavate new cavities, defend territories, and feed the young.

RCWs feed mostly on forest insects, but will also eat small fruits and seeds. They forage primarily on the surface of living pine trees within pine dominated forest stands. Large pines, normally greater than 10 inches DBH, are preferred as foraging substrate (USFWS 1985). Pine dominated stands are generally not considered potential foraging habitat until they reach 30 years of age (USFWS 1989) but will forage in younger trees if the midstory is controlled.

Developing RCW habitat, especially nesting sites, where none exists currently requires a long-term commitment. Cavity trees must be of sufficient age and diameter to support the excavation of an RCW cavity. Trees at a minimum must contain 6 inches of heartwood to allow for cavity construction. Research indicates that for most pines to reach this size requires 60 to 80 years. For management purposes, the minimum cluster area size is 10 acres. Pine dominated stands must grow for extended periods, well beyond the age trees are initially selected for cavity excavation. In cases where potential cavity trees are present, adequate foraging habitat surrounding these mature trees may be lacking. Providing adequate foraging habitat may require 30 years.

The above species information is very general. Those wishing to learn more about the RCW should refer to the revised 2003 RCW Recovery Plan (USFWS 2003) or a compilation of literature on the RCW prepared by Costa *et al*. (1996). A wealth of information is also available in four published proceedings of symposia on the RCW (Kulhavy *et al*., 1995, Thompson 1971, Wood 1983, Costa *et al*. 2003).

4.1.4 Training Mission

The Fish and Wildlife and Forestry sections of the NRB of the DPWL have the primary role and responsibility for the implementation of the INRMP, including the ESMC. The ITAM of DPTMS also is an integral participant. To minimize conflicts between endangered species management and training these groups will closely coordinate their individual efforts through implementation of the INRMP. A detailed discussion on the training mission is provided in Section 2.1.5. Figure 4-2 depicts lands removed from the RCW HMU to support the current and future military mission.

Fort Gordon's ITAM program should incorporate RCW conservation. Close coordination between DPTMS and DPWL ensures that field training does not adversely affect the RCW. Through a similar program conducted by DPWL, a member of each military unit, usually at the company level, is educated about a wide variety of environmental subjects, including conservation of endangered species. This unit member, the Environmental Compliance Coordinator, is charged with educating other members of the unit. Specific civilian employees are also educated through this program.

4.1.5 Population Goal

The Guidelines and the revised 2003 RCW Recovery Plan establish Recovery Units and population goals for Federal, state, and private lands within those recovery units. Installation population goals (measured as potential breeding groups, PBGs) established under the ESMC are in accordance with goals established in the revised 2003 RCW Recovery Plan. The installation population goal (IPG) should be considered long-term but is subject to change, through consultation with USFWS, based upon changing circumstances, changing missions, or new scientific information. In conjunction with the 1-year and 5-year reviews of the ESMC, Fort Gordon will re-examine population goals to adjust for changing conditions.

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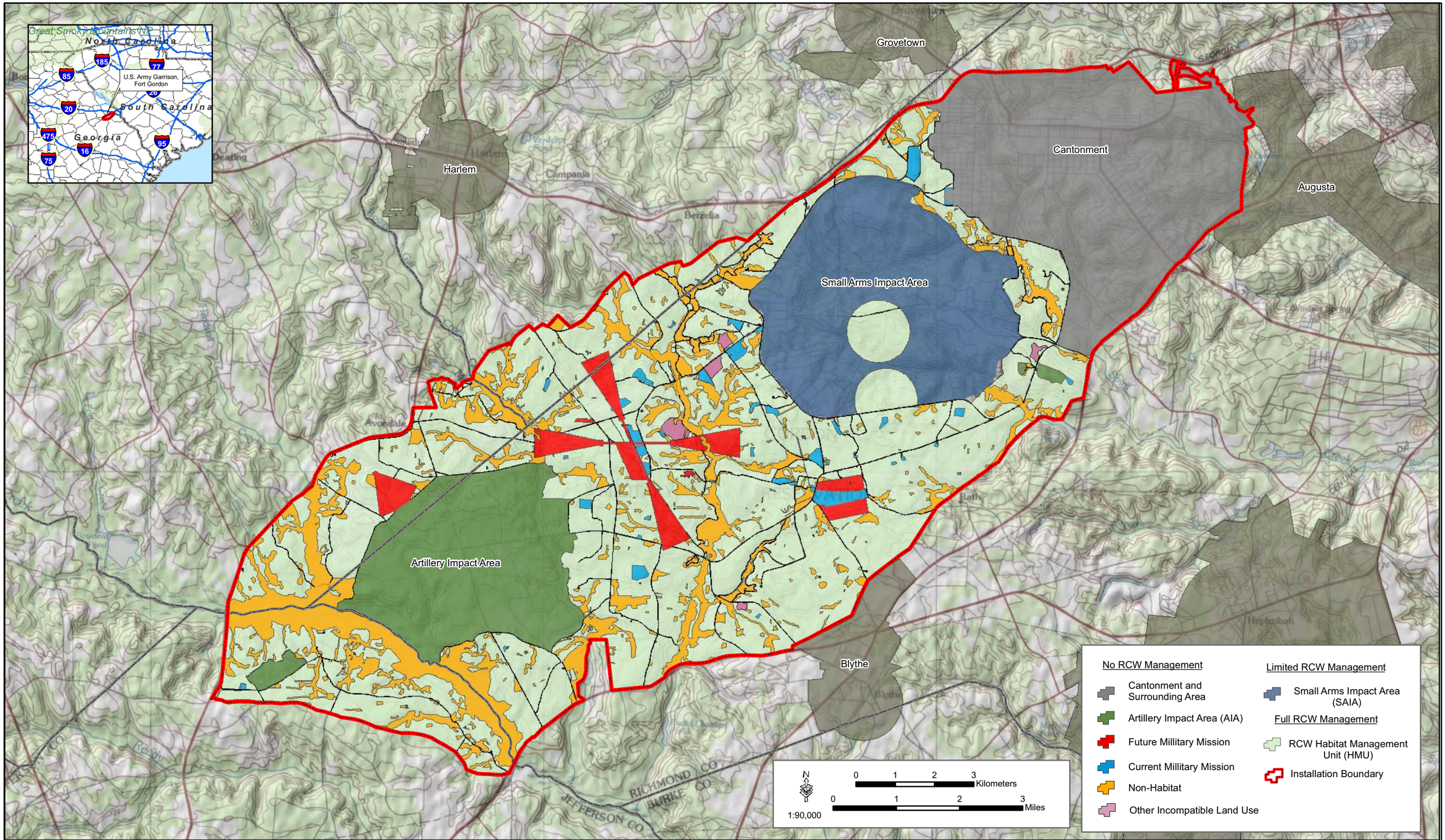

Figure 4-2: Fort Gordon's Red-Cockaded Woodpecker (RCW) Habitat Management Unit (HMU), Fort Gordon, Georgia

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The Fort Gordon ESMC team used steps detailed in the Guidelines to develop the HMU and identify the long-term population goal, stated as number of PBGs. Due to Fort Gordon's size and isolation from adjoining populations, Fort Gordon's population is not a primary recovery population as defined in the RCW Recovery Plan (Fort Gordon 2008a). Fort Gordon has been designated as a significant support population, contributing to the regional recovery goal. The installation population goal reflects Fort Gordon's contribution to the Regional Recovery Goal, as outlined in the revised 2003 RCW Recovery Plan. The IPG for Fort Gordon is 122 PBGs.

The general procedure for developing the RCW population goal for Fort Gordon can be summarized in four steps, as follows:

(1) Fort Gordon's land base encompasses 55,600 acres. A map of the current and potential RCW habitat for the entire installation was created (Figure 4-3). This step includes areas currently containing pine or pine-hardwood forest or areas where these types of stands can be developed.

(2) Current and future land uses that would prohibit management for RCWs includes, with a few exceptions, developed cantonment and surrounding areas, the SAIA, the AIA, current and future mission requirements, bottomland hardwood stands, swamps, marshes, and ponds. The total land base excluded from RCW management is 31,288 acres. Based on land available for RCW management, the current and potential RCW habitat for the entire installation is approximately 24,300 acres.

(3) Based on the current and potential habitat; Fort Gordon's IPG is 122 PBG. To determine the number of PBG the current and potential habitat (24,300 acres) was divided by the amount of forage habitat required to support one cluster. Based on Fort Gordon's quality and condition of habitat, each active cluster will be partitioned into 200 acres of forage habitat. Refinements to the HMU and population goal will be an ongoing process.

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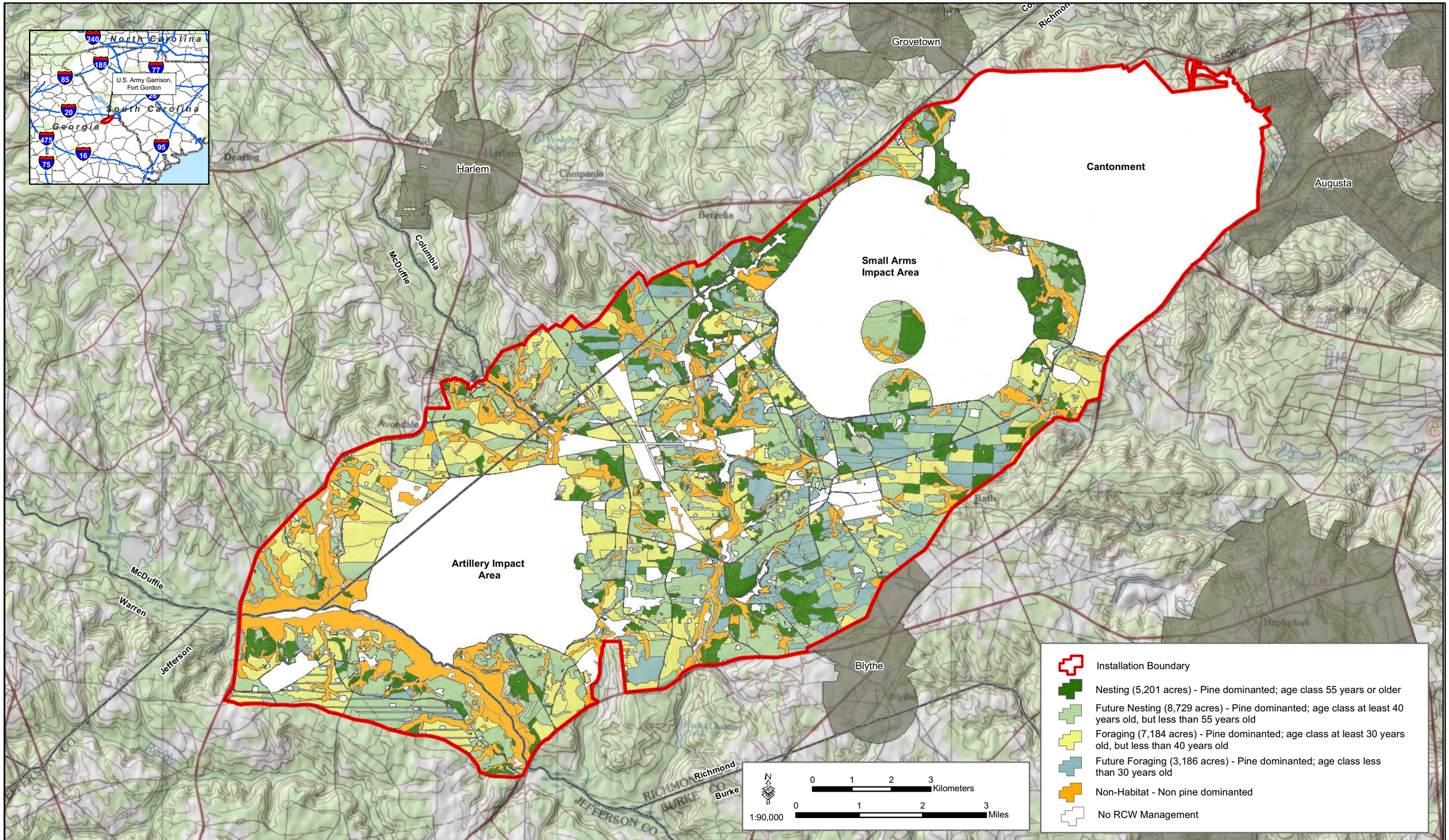

Figure 4-3: Current and Potential Red-Cockaded Woodpecker Habitat on Fort Gordon

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(4) The delineated HMU and associated population goal should be realistic for at least the next 5 years unless there are significant changes to Fort Gordon's mission, training base expansion is required, or scientific knowledge of RCW management significantly changes. Throughout this plan, “long-term” will refer to the time frame that exceeds 5 years.

Fort Gordon’s most current forest inventory was completed in 2006. Re-inventory of the installation began in 2008 by the Forestry Section. A variable plot sampling technique is being used except in impact areas, where comparable data are collected in similar stands outside the impact areas. Stands will be re-inventoried during the installation-wide forest inventory scheduled for completion in 2014 (see Section 4.5). When this plan is revised in 5 years, the HMU will also be reviewed using the new stand information.

RCW populations were censured in late summer or early fall of 2007 and are summarized in Table 4-1 below.

Table 4-1. 2004 RCW Census Data on Fort Gordon

Parameter	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of active clusters	5	5	7	8	8	11	11	13	15
Number of PBG’s	5	3	7	7	8	8	11	11	12

Fort Gordon 2008a

Fort Gordon's RCW population was extirpated in 1993. The last confirmed activity on the installation was in the summer of 1990 in TA 22 (Fort Gordon 2008a). On February 23, 1996, NRB personnel confirmed the presence of a single RCW in TA 21. The RCW had been banded and was later confirmed as a migrant from the Savannah River Site, approximately 30 to 35 miles southeast of the installation. Monitoring of the reactivated site during the winter of 1997 revealed that the bird was a male, and plans to translocate other birds were initiated that March. Single females were moved during the breeding season in 1997 and 1998 with both attempts being unsuccessful. Translocation of multiple RCWs (single female and two pairs) in 1998 were successful.

Projecting the population growth for the next 5 years is difficult because many factors that affect population growth interact in complex ways (Walters 1990). Factors include survival of adults and young, reproductive success of pairs, number and sex of birds available for translocation, success of attempted translocations,

and reproductive success of translocated birds. The projected optimum rate of growth, 5 to 10 percent, was determined in consultation with USFWS and is based on rates of growth of other small RCW populations. Based on population growth over the previous 4 years, Fort Gordon's estimated population goal by FY 2013 is approximately 20 active clusters, based on a 10 percent natural increase. Translocation efforts are not considered in this rate of growth.

A preliminary determination of the number of clusters that Fort Gordon will be able to support for at least the next 30 years is approximately 40. This estimate is mainly constrained by current available habitat. Thousands of acres containing off-site species must be converted to on-site pines. Much suitable on-site habitat is in relatively small blocks and is not contiguous with larger blocks of suitable habitat. Creating large, contiguous blocks of additional suitable habitat will require 30 years following conversion. A more detailed determination of cluster numbers for this same period will be developed following completion of the current forest inventory.

Fort Gordon estimates that an initial long-term goal of 40 active clusters should be reached between 2025 and 2035. At that time, the existing onsite pine will be suitable nesting habitat. The remainder of the HMU and many of the stands that are converted in the next 5 to 10 years should be suitable for foraging.

4.1.6 Relocation of Mission Requirements

Developing the HMU identified mission requirements that could be relocated to avoid RCW distribution on the installation. The map of mission requirements was overlaid on habitat within 0.5 mile of active clusters and recruitment clusters. This exercise determined that mission requirements do not currently conflict with RCW cluster habitat. Future mission requirements will be evaluated/reviewed to assess potential impacts as appropriate. Mission requirements that cannot be relocated, such as archaeological sites (and their buffers) and solid waste management units, were not addressed. To avoid RCW habitat loss, the extent of tree clearing required for future proposed projects (Section 4.1.13.1) will be coordinated with DPWL and DPTMS and minimized as much as possible.

4.1.7 Management Guidelines and Prescriptions

Management procedures detailed in the Guidelines as well as the revised 2003 RCW Recovery Plan were modified to meet specific management needs at Fort Gordon. A summary of RCW management actions on Fort Gordon is provided in Table 4-2.

Areas requiring other changes or limitations to the methods are discussed in Section 4.1.8 and Section 4.1.9.

Table 4-2. Summary of RCW Management Actions

Management Action	Objective
Establish the HMU	Defines the geographic future area geographic area of the installation's RCW population. HMU must provide sufficient nesting and foraging habitat for installations RCW population goal.
Timber management	Use silvicultural methods and other forestry practices in HMU to develop and maintain the habitat necessary to support the installation's RCW population goal.
Restoration and construction of cavities	Repair existing artificial and natural cavities, and install artificial cavities or inserts to provide suitable cavities within HMU.
Reduce depradation and competition for RCW cavities	Implement actions to protect RCW cavities from predators (*e.g.*, flying squirrel). Install protection devices to protect the integrity of RCW cavities.
Protect RCW clusters	Implement actions (*e.g.*, signage and policy) to restrict activities within RCW clusters.
Translocation and augmentation of RCWs	Translocate individual RCWs from the installation or off-site to expand the installations RCW population.
Population monitoring	Monitor active and provisional recruitment clusters to assess population status and management actions needed.

4.1.7.1 General Habitat Management Unit Practices

Nesting and foraging areas sufficient to attain and sustain installation RCW population goals were identified in the ESMC. HMU delineation is an important step in the planning process because it defines the future geographic configuration of the installation RCW population. Areas designated as HMUs for all active and recruitment clusters, regardless of training restriction status, must be managed according to the Guidelines.

Areas Included in HMUs

HMUs will encompass all clusters, areas designated for recruitment, and adequate foraging areas. Clusters that have been documented as continuously inactive for a period of 5 consecutive years or more may be deleted from RCW management requirements. Designated recruitment clusters that have not been occupied for a period of 5 consecutive years may also be deleted from HMUs. Once deletion of a cluster from management is approved by USFWS, existing cavities may be covered to discourage reactivation. In designating HMUs, fragmentation of nesting habitat will be avoided. Fort Gordon will attempt to link HMUs with corridors, allowing for demographic interchange

throughout the installation population. Adequate acreage and quality of foraging habitat must be provided with HMUs. Additionally, adequate foraging habitat must be located to support existing and recruitment clusters. Fort Gordon will determine availability of and manage for foraging habitat in accordance with guidelines established in Chapter 8.1 of the revised 2003 RCW Recovery Plan.

Fort Gordon may formulate population-specific foraging guidelines in consultation with USFWS. Population-specific guidelines must be based on site-specific studies consisting of multiple year (typically 3 to 5 years) data on RCW groups and population health and their relationships to quantity and quality of foraging habitat. Chapter 8.1.4 of the revised 2003 RCW Recovery Plan provides guidelines for determining population-specific foraging guidelines. The HMU is located where there will be a minimum impact upon current and planned installation missions/operations and is consistent with land use requirements in the Real Property Master Plan.

Prescribed burning is normally the most effective means of midstory control and is recommended as the best means of maintaining a healthy ecosystem. Prescribed burning will be conducted at least every 3 years in longleaf, loblolly, slash, and shortleaf pine systems. Burning must be conducted in accordance with applicable Federal, state, and local air quality laws and regulations. Prescribed fires will be conducted in accordance with Fort Gordon's Integrated Wildland Fire Management Plan (IWFMP, Section 4.15). With the agreement of USFWS, the burn interval may be increased to no more than 5 years after the hardwood midstory has been brought under control. Cavity trees will be protected from fire damage during burning. Burning should normally be conducted in the growing season because the full benefits of fire are not achieved from non-growing season burns. Winter burns may be appropriate to reduce high fuel loads. Use of fire plows in clusters (within the 200-foot buffer) will be used only in emergency situations. Emergency situations consist of an immediate threat which could destroy an active cavity tree.

While other areas within the HMU do not require the same level of intense management as active clusters and recruitment clusters, the quality of foraging stands must be maintained by a variety of methods including a prescribed burning program sufficient to control hardwood growth, eliminate dense midstory, and reduce fuel levels to prevent wildfires. Current alternatives to prescribed burning for hardwood midstory control include the following:

(1) Mechanical - Rotary mowers (both tractor-drawn and skidder mounted), and drum-choppers drawn by rubber-tired skidders and bulldozers.
(2) Manual - Hand operated chainsaws and gas-powered line trimmers with saw blades.
(3) Chemical - Registered herbicides applied by broadcast spray and single stem injection techniques.

These methods will only be used when prescribed burning is not feasible or is insufficient to control a well-advanced hardwood midstory. All three alternatives above may be used in both nesting and foraging habitat. Application of herbicides will be consistent with applicable Federal, State, and local laws and regulations.

Cluster Management

Due to RCW biological needs, nesting habitat requires a more intense level of management than other habitat. Maintenance priority will be given to active clusters over both inactive and recruitment clusters. Fort Gordon NRB will manage habitat within active and recruitment clusters in accordance with guidelines established in the RCW Recovery Plan and the Guidelines. Across Fort Gordon, some active clusters and recruitment clusters contain specific cavity trees that are inappropriate to continue to manage. Such trees will not be cut or actively managed, but they will be maintained. Examples include trees containing cavities that are no longer suitable for RCW or trees located in areas that will not be managed as RCW habitat (*e.g.*, upland or bottomland hardwood areas). Natural resources personnel trained in RCW management will determine which cavity trees will no longer be actively managed.

In all active clusters, a minimum of four suitable cavities or at least the number of cavities equal to the number of birds that remain after all young have fledged will be maintained. A minimum of four suitable cavities will be maintained in all recruitment clusters, including new recruitment clusters once they are provisioned (see Section 4.1.7.1.3). Active clusters and recruitment clusters will be kept clear of dense midstory. An open, park-like pine stand of at least 10 acres is optimal. All foraging stands should consist of no or sparse hardwood maintained below 7 feet in height. Canopy hardwoods will comprise less than 10 percent of canopy trees in longleaf pine stands and 20 percent in loblolly pine stands. Pines within 50 feet of an existing cavity tree that are large enough or old enough to provide foraging habitat will only be removed if deemed necessary by a RCW biologist.

Recruitment Cluster Selection

Given current stand conditions, over the next 5 years, Fort Gordon can potentially provide 30 recruitment clusters. Current priority for the selection and management of recruitment clusters, from highest to lowest, and those that currently meet the selection criteria are presented in Appendix S.

4.1.7.2 Timber Management in the HMU

Timber management in the HMU should develop the habitat necessary to support the RCW population goal. Additionally, timber management will be consistent with RCW conservation and comply with silviculture guidelines in Section 8J of the revised 2003 RCW Recovery Plan (USFWS 2003). Silvicultural methods that maintain or regenerate the historical pine ecosystem will be used. Most habitats occupied by the RCW on Fort Gordon are characterized by old-growth longleaf pines in an uneven-age forest interspersed with small, even-aged patches ranging from 0.25 to 2 acres (ac) in size. Timber management methods will be carefully designed to achieve and maintain historical conditions through the emulation of natural processes.

Good quality foraging habitat has some large old pines, low densities of small and medium pines, sparse or no hardwood midstory, and groundcover consisting of bunchgrass and forbs. Based on the 2003 Recovery Plan good quality habitat has all of the following characteristics:

a. There are 18 or more stems/ac of pines that are $\geq$ 60 years in age and $\geq$ 14 inches DBH. Minimum basal area (BA) for these pines is 20 square feet/ac (ft^2/ac). Recommended minimum rotation ages apply to all land managed as foraging habitat.

b. BA of pines 10 to 14 inches DBH is between 0 and 40 ft^2/ac.

c. BA of pines < 10 in DBH is below 10 ft^2/ac and below 20 stems/ac.

d. BA of all pines $\geq$ 10 in DBH is at least 40 ft^2/ac. That is, the minimum BA for pines in categories (a) and (b) above is 40 ft^2/ac.

e. Groundcovers of native bunchgrass and/or other native, fire-tolerant, fire-dependent herbs total 40 percent or more of ground and midstory plants and are dense enough to carry growing season fire at least once every 5 years.

f. No hardwood midstory exists, or if a hardwood midstory is present it is sparse and less than 7 ft in height.

g. Canopy hardwoods are absent or less than 10 percent of the number of canopy trees in longleaf forests and less than 30 percent of the number of canopy trees in loblolly and shortleaf forests. Xeric and sub-xeric oak inclusions that are naturally existing and likely to have been present prior to fire suppression may be retained but are not counted in the total area dedicated to foraging habitat.

h. All foraging habitat is within 0.5 mile of the center of the cluster, and preferably, 50 percent or more is within 0.25 mile of the cluster center.

i. Foraging habitat is not separated by more than 200 ft of non-foraging areas. Non-foraging areas include (1) any predominantly hardwood forest, (2) pine stands less than 30 years in age, (3) cleared land such as agricultural lands or recently clearcut areas, (4) paved roadways, (5) utility rights of way, and (6) bodies of water.

The objective of these parameters is to provide high quality foraging habitat as close as possible to the cluster, rather than large areas of poor habitat. Until midstory vegetation can be controlled and pine stands mature, all stands meeting these minimum characteristics will be considered foraging habitat.

In general, where site conditions permit, the goal for RCW foraging habitat will be to maintain or establish stands with 40 to 80 ft^2/ac of pine BA and a minimum of 18 pines 14 inches in DBH or larger per acre. Stocking levels on Fort Gordon may vary from those on which figures in the revised 2003 RCW Recovery Plan are based. In coordination with the USFWS, Fort Gordon may develop site-specific criteria for foraging analyses based on acreage.

Fort Gordon will assign forage habitat to clusters with overlapping 0.5 mile foraging areas using a new method called habitat partitioning. A habitat modeling tool known as the RCW Matrix has been developed using geographic information systems (GIS), based on the recommendation within previous foraging guidelines (USFWS 1985) that all foraging habitat be within 0.5 mi of the center of the cluster. The technique consists of first creating 0.5 mi foraging circles around the center of each cluster, then applying tabular data of stand characteristics to determine availability of foraging habitat within the newly created circular polygon. Where foraging circles overlap, the area of overlap is partitioned into equal sections and allocated accordingly. Technical resources are

available to assist managers and researchers in partitioning the complex overlaps that are common in areas with high cluster densities (Lipscomb and Williams 1996, 1998). Complete and partitioned foraging circles are referred to as foraging partitions.

With the exception of prescribed burning activities and emergency construction of artificial cavities, timber and pine straw harvesting and habitat maintenance activities will not be conducted in active clusters during the nesting season (1 April through 31 July).

Regeneration Methods

Several different types of regeneration methods such as clear cutting, seedtree and shelterwood can be used to regenerate pine stand on Fort Gordon. Longleaf pine can be regenerated using single tree or group selection methods where enough trees exist to support this method. Loblolly pine will be regenerated using seedtree or shelterwood methods. Pine seedlings may be planted where needed to ensure adequate stocking of seedlings. Regeneration methods to be used for off-site stand conversions are discussed in the following paragraph. When available, six to ten residual trees per acre of the native pine species being regenerated will be left standing indefinitely when a stand is regenerated. For more information concerning specific regenerations methods see the Forest Management Section of this INRMP (Section 4.5).

Stand Conversions

Stand conversions involve the re-establishment of the pine species adapted to a particular site after off-site pine or scrub oak has been removed. Historically, off-site species replaced longleaf pine because of its relatively slow growth and problems with regeneration. Sites believed to historically support longleaf pine have not been converted to other pine species since 1986. Native pines stands will not be converted to off-site species.

Fort Gordon's priority is to convert appropriate sites to longleaf pine; however the tree species to be restored on each conversion site will depend on soil type and site conditions. The majority of conversion sites are best suited for longleaf pine, including some sites currently supporting loblolly pine, an off-site species. The few areas in slash pine or scrub oak that are adjacent to wetlands will be converted to loblolly pine. Slash stands within the HMUs that appear to be healthy and growing vigorously will be managed the same as native pine stands until a need for a final harvest is determined, at which time they will be converted to either longleaf or loblolly pine. Slash pine stands may need to be retained for

RCW management until native species are large enough to be used as forage habitat.

Two approaches can be used to plant pine seedlings. The first approach is to plant bare rootstock using a mechanical machine planter, and the second approach involves planting containerized seedlings either by hand or mechanical planter. The type of planting method to be used will vary depending on the site.

Sites that historically supported hardwood stands, in both upland and bottomland areas, will not be converted to pines. These hardwood stands are not considered part of the HMU and managing them as hardwoods will not change the RCW population goal.

For more information concerning stand conversions see sections 4.5.6.7 and 4.5.10.2 of the Forest Management Section of this INRMP or Section 8.J. of the revised 2003 RCW Recovery Plan (USFWS 2003).

Forest Pest and Disease Management

Trees within the HMU affected by infectious tree diseases or beetle infestation (*e.g.*, Ips beetles ([*Ips* spp.] or southern pinebark beetle [*Dendroctonus frontalis* Zimmermann] will be evaluated for treatment. Treatments for beetles may include the use of pheromones, cutting and leaving, cutting and removing, or cutting and burning infected trees. Before cutting an infected cavity tree, a suitable replacement cavity tree will be identified and provisioned. Forest pest and disease management is discussed under Forest Management (Section 4.5.15.1).

Consultations Regarding Forest Management

Thinning pine stands and conversion of stands to historic on-site pines are designed to maintain, develop, and restore quality RCW habitat. However, these procedures may require removal of potential foraging habitat and possibly reducing current foraging habitat below recommended guidelines. USFWS will be consulted before implementing these procedures. The installation will attempt to limit this type of consultation to twice per year, once for proposed thinning and once for proposed stand conversions.

Fort Gordon will consult with USFWS once annually on all proposed stand treatments that will reduce forage in clusters or recruitment clusters below minimum requirements.

Pine Straw Harvesting

Pine straw management and harvesting is discussed in detail under Forest Management in Section 4.5.8 of this INRMP.

4.1.7.3 Restoration and Construction of Cavities

Restoration of Cavities

Active and inactive RCW cavity entrances and starts, whether naturally or artificially constructed, found to be in poor condition during periodic inspections will be repaired whenever feasible to prolong cavity use. Cavity restrictors will be installed on enlarged RCW cavity entrance holes (greater than 2 inches in diameter) to optimize the availability of suitable cavities. Where suitable cavities are limited, the threat of enlargement is great.

Restrictors will be installed to protect RCW cavity entrances that have not been enlarged. Priorities for the installation of restrictors will be: active single tree clusters, single bird clusters, clusters with less than four suitable cavities, and other clusters. Restrictors will not be placed on the entrances of cavities no longer being managed.

Techniques for installation of restrictors will be based on Carter *et al.* (1989). An opening size of 1.75 inches will generally be used. Reaction of RCWs to restrictors will be monitored when they are placed on the entrance of active cavities. Monitoring will be conducted the same day a restrictor is placed around the entrance of an active cavity. If avian competitors larger than the RCW continue to use the cavities, restrictors with 1.5-inch openings will be used and closely monitored. Adjustments to the positioning of the restrictors will be made to ensure competitors are excluded and RCW access is unencumbered; however, all inserts installed on Fort Gordon already have cavity restrictors installed on them.

Additional measures to maintain the suitability of a cavity will be used on inactive cavity trees if these are deemed likely to benefit the RCW. For example, if a usable cavity has two entrances and one has been enlarged beyond repair, the enlarged entrance will be closed with a metal plate covered with wood filler. The effect of these measures on RCW will be monitored if the tree is reactivated.

Construction of Cavities

Artificial RCW Cavity Insert

Artificial cavities or inserts will be placed in areas designated for recruitment or translocation and in clusters where the number of suitable cavities is a limiting factor. The objective is to provide at least four suitable cavities per active or recruitment cluster. All cavity inserts will be installed with restrictor plates and have PVC pipe glued to the cavity entrance. Priorities for installation of artificial cavities will be: active clusters with a single cavity tree, active clusters with insufficient cavities to support a breeding group, and recruitment clusters in the order specified in Appendix S. In all active clusters, a minimum of four suitable cavities will be maintained. In instances where group size is greater than four, additional cavities may be provided to ensure that all adults in the cluster have access to a cavity.

Cavity construction will be by either the drilling or insert technique and accomplished by fully trained personnel. Copeyon's (1990) technique will be used to construct drilled starts. Drilled cavities will be built using Taylor and Hooper's (1991) method. Allen's (1991) technique, with minor modifications developed by the U.S. Forest Service, will be used to install inserts.

Insert and restrictors used to protect inserts may be modified to prevent competitors from destroying or modifying the cavities or their entrances. Examples of such modification include:

(1) Glue PVC pipe to the entrance of inserts (Richardson and Bradford, 1996). Fort Gordon has converted all inserts on the installation to have a PVC entrance.

(2) Make a smaller, circular opening in the full-face plate restrictor used to cover the inserts; The existing opening is oval and competitors are enlarging the entrance of the insert from this oval-shaped opening.

(3) Modify the full-face plate restrictor to extend beyond the edges of the insert.

The sides of the restrictor would be nailed to the tree. Red-bellied woodpeckers (*Melanerpes carolinus*) and pileated woodpeckers create holes in the inserts from the box, where the tree and the side of the box meet. A restrictor enlarged to cover this gap would prevent this from happening. The restrictors will be adjusted to make them small enough to permit face plate construction by the RCW but large enough to prevent other species from entering inserts from the side.

4.1.7.4 Measures to Reduce RCW Predation and Competition for RCW Cavities

In small RCW populations, it is important to use all management techniques possible to ensure that predation of adults, offspring and eggs are minimized. Techniques that reduce competition for cavities will also provide greater potential for population expansion. Initial studies on squirrel excluder devices (SQEDs) and snake excluder devices (SNEDs) indicate these tools help reduce cavity competition and predation on RCW (Montague 1994, Montague *et al*. 1995, Neal *et al*. 1993, Withgott *et al*. 1995). Competition for RCW cavities may be further reduced by placing nest boxes or alternate potential roost sites for competitors near the clusters (Kappes and Harris 1995, Loeb and Hooper 1995, Fort Gordon 2008a). Flying squirrels as well as other predators will be removed as required by the most effective means possible

SQEDs and SNEDs are currently not in use at Fort Gordon. Fort Gordon will evaluate and use these devices in coordination with the appropriate agencies. However, SNEDs 28 inches wide are not wide enough to deter large rat snakes (*Elaphe* sp.) from climbing RCW cavity trees in some areas (Neal *et al.* 1993, Withgott *et al*. 1995). These techniques may be modified to make them more effective at Fort Gordon.

Attempts will be made to increase the effectiveness of the two-strip SQED design before using the single-strip design (Montague 1994). For example, widening the strips and removing trees adjacent to the cavity trees with SQEDs might make the two-strip design more effective. Removing adjacent trees requires flying squirrels to glide further distances to the area between the strips containing the cavity entrance. SQEDs will be placed on at least all existing active cavity trees when these devices are placed in active clusters.

SQEDs may occasionally be damaged by other woodpeckers creating sharp edges. SQEDs in these clusters will be replaced if a biologist deems them unsafe for RCW. SQEDs may be permanently removed from clusters where they are continually

damaged and made hazardous to the RCW. Methods to reduce the damage to these structures by other woodpeckers and other wildlife in general, will be examined. For example, SQEDs may be painted to determine if this reduces damage yet provides an effective barrier to flying squirrels.

SNEDs of at least 36 inches are proving to be more effective in Mississippi than the more narrow ones developed in Arkansas. SNEDs used on active cavity trees at Fort Gordon will be at least this wide. Other modifications, such as a resin deflector similar to that of SQEDs, may be used to increase the effectiveness of these devices. SNEDs may be placed on trees with limbs that contact cavity trees to prevent snakes from accessing cavity trees via adjacent trees.

SNEDs apparently do not have any adverse impacts on the RCW (Withgott *et al.* 1995), most likely because they are placed at the base of the trees. Monitoring of SNEDs during group checks will continue to ensure there are no adverse impacts to the RCW. Other experiments related to use of SQEDs and SNEDs may be used to further improve the effectiveness of these management tools. In most cases, both devices will be used on the same cavity tree.

Nest boxes for other species may be placed in or adjacent to active clusters and provisioned recruitment clusters in an attempt to reduce competition for RCW cavities. Boxes designed specifically for squirrels and for certain birds, mainly the red-bellied woodpecker (RBW), may be placed in or near the same cluster. Boxes designed for flying squirrels placed in the vicinity of clusters may increase the RCW's reproductive success. Fort Gordon proposes to initiate its nest box program by placing boxes designed for squirrels in the vicinity of active clusters and provisioned recruitment clusters on the installation. Boxes for RBWs will be placed near clusters being used by this species as time permits. As an alternative to nest boxes for RBW, snags may be created by girdling appropriate trees. Preliminary evidence indicates that presence of large snags in/near clusters may reduce RBW use of RCW cavities (Kappes and Harris 1995). Trees must be a minimum of 10 inches in DBH and 30 feet high to be suitable for RBW cavities (Kappes and Harris, 1995) and will be girdled only if appropriate hardwoods are available or if large pines are available which will not be used for future RCW cavity construction.

In no case will relict pines be used for snag creation. A minimum number of clusters where snags will be created is not being

established. Snags will only be created in or near clusters experiencing problems with RBWs, or other avian competitors, roosting in managed RCW cavities. As deemed necessary by installation biologist, a minimum of three snags, including suitable existing snags, will be created/managed in or near such clusters.

No new SQEDs, SNEDs, or nest boxes/snags will be erected or created when installation biologists determine that their associated costs are higher than the benefits obtained. SQEDs, SNEDs, and nestboxes in place may be removed if it is believed that lack of maintenance may cause adverse impacts to the RCW.

Other techniques designed to reduce competition for cavities or predation on the RCW will be considered. Appropriate monitoring will be performed to ensure these techniques do not adversely affect the RCW. Fort Gordon will consult with the USFWS prior to the use of any technique designed to reduce competition or predation.

4.1.7.5 Protection of Clusters

Markings

Clusters and individual cavity trees must be easily recognizable by all personnel entering active clusters if they are to be protected. Therefore, all living cavity trees located within designated clusters will be marked with two white bands approximately 4 to 6 inches wide and 6 to 12 inches apart. The bands will be centered approximately 4 to 6 feet from the base of the tree, but may be centered higher on trees with SNEDs to preclude painting bands on these devices. A uniquely numbered small metal tag will be affixed to the cavity tree for identification purposes.

A 200-foot buffer around each cavity tree in active clusters and provisioned recruitment clusters will be marked with warning signs posted at reasonable intervals facing to the outside of the buffer and along roads, trails, firebreaks, and other likely entry points into the buffer. Where cavity trees are within 400 feet of each other, the marked buffer will overlap and surround the aggregate of trees. Where cavity trees are separated by more than 400 feet, separate marked buffers will be established. Signage will follow the specifications outlined in the Guidelines. Signs posted at the marked buffer will be constructed of durable material, 10 inches square, oriented as a diamond, and white or yellow in color. A RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 0.375 inches in height. Where warranted, reflective tape will be affixed to cavity trees and certain trees at the edge of the buffer zone to increase its visibility during night time maneuvers. The reflective tape will be placed on buffer trees at likely vehicle entry points. Markings must be as uniform as possible on Army installations to reduce the possibility of confusing soldiers who must train on different installations.

Buffer markings, including signs on trees, may be removed around cavity trees that will not be managed but that occur in active clusters and provisioned recruitment clusters, (*e.g.*, trees with cavity entrances that are too large for restrictors or cavities that are no longer useable). Generally, removal of the buffer will depend on the trees' location relative to other, managed cavity trees. The decision to remove the buffer markings will be made by an RCW biologist. Buffer markings will be removed around cavity trees in clusters to be removed from management (see Section 4.1.15.1). In consultation with USFWS, the installation may remove buffers around specific clusters in a TA. All cavity trees will retain the two white bands.

Training

The purpose of training restrictions associated with RCW clusters is to avoid or minimize the potential for "take" as defined under Section 9 under the ESA. Implementation of training restrictions on Army installations will balance support of RCW population growth to achieve an installation's population goals and flexibility to achieve training mission requirements.

Designation of Protected Clusters.

In accordance with the 2007 Army Guidelines, installations with population goals less than 250 PBGs can, in cooperation with the USFWS, reduce some training restrictions as data becomes available from installations where training restrictions have been decreased or removed. Other factors to consider will be training mission, population aggregation and results (based on monitoring and/or research) of training impacts on unprotected clusters from the subject and other installations. Based on information presented and discussion at the 2008 U.S. Army RCW coordination meeting with the USFWS and informal consultation during the development of the 2008-2013 ESMC, Fort Gordon negotiated to protect approximately 40 PBGs. However in order to monitor success of protected vs. unprotected clusters, it was also negotiated to unprotect 10 percent of the protected 40 PBGs. Therefore four recruitment clusters can be installed and left unprotected by not posting buffer signs or banding individual trees. In accordance with the Army Guidelines certain activities such as refueling points, generators, smoke generators, smoke pots and mechanical digging will not be allowed within the buffer zones around any cluster. Selection of these unprotected clusters will be done in close coordination with DPTMS in order to prevent any training conflicts. All other clusters will be protected with normal buffer and tree markings.

Data collected from the unprotected clusters will be compared to data collected from protected clusters. This performance data can be used once the installation population goal reaches 40 PBGs to support removing protection from additional clusters. As Fort Gordon reaches 40 PBGs, the installation will consult with the USFWS to establish more unprotected clusters. Removal of training restrictions is dependent on growth or maintenance of the installation RCW populations. Schedules for removing training restrictions will be implemented after appropriate consultation with USFWS.

- Protected Clusters. Clusters subject to training restrictions as identified in Appendix 1 and paragraph V.C.5 and guidance for certain activities identified in paragraph V.C. of the revised 2003 RCW Recovery Plan (USFWS 2003).
- Unprotected clusters. Clusters not subject to training restrictions identified in Appendix 1 of the revised 2003 RCW Recovery Plan (USFWS 2003). These clusters are still subject to guidance for certain activities under paragraphs V.C. and V.C.5 of the revised 2003 RCW Recovery Plan, unless otherwise authorized through consultation with USFWS (preferably through the ESMC process).

The protection of clusters and recruitment clusters on Fort Gordon depends on an understanding of the goals and requirements of RCW conservation by the military personnel training in the field. Soldiers are informed of endangered species issues as part of the ECC and Range Training Area Safety Certification courses.

Damage and disturbance in clusters outside the AIA is controlled by USASC&FG Regulation 210-21 (USASC&FG 1994**)**. Entry into an RCW cluster is strictly regulated. Appendix 1 of the Guidelines summarizes the training activities that are permitted or restricted in marked buffer zones around cavity trees. Additionally, USASC&FG Regulation 420-7 provides guidance for activities in proximity to endangered species sites (Appendix H). Some training activities that are not allowed within 200 feet of a marked cavity tree are generators, smoke generators and smoke pots, establishment of signal sites, artillery firing points, fueling points, etc. However, certain activities will be allowed within the 200-foot buffer. Some of these activities are blank firing of 7.62 millimeter and smaller calibers, artillery and hand grenade simulators, smoke grenades, foot traffic through the cluster, cutting natural vegetation (hardwood only) for camouflage, etc. Removal of pines anywhere on Fort Gordon is prohibited unless prior approval is received from DPWL, ED and DPTMS (see Section 4.1.7.7, Project Surveys). Removal of hardwoods for camouflage is permitted, and will be encouraged in RCW habitat where hardwood midstory control is needed. Range Regulations will be amended to make training restrictions consistent with the Guidelines. Military vehicles are not permitted within 50 feet of marked cavity trees unless the vehicles are traveling on existing roads, trails, or firebreaks. Military training within marked cavity tree buffers will be limited to transient activities that may not exceed 2 hours.

RCW nesting habitat will be managed by clusters or cluster stands. However, training restrictions will apply only within marked buffer

zones around cavity trees. RCW related training restrictions, except removal or destruction of pines, do not apply to unprovisioned recruitment clusters, inactive clusters removed from management, and areas outside of the marked buffer of active clusters and recruitment clusters. The restrictions will apply to a cluster once it is provisioned and the cavity trees and buffer are marked. Pine removal anywhere on the installation must be approved through environmental review procedures (except as allowed by Section 4.1.7.7, Project Surveys) prior to implementation. These restrictions do not prohibit DPWL natural resources personnel from using prescribed fire, silviculture treatments, or any other accepted management practice in the performance of their duties. Prescribed fires will be conducted in accordance with Fort Gordon's IWFMP (Section 4.15).

Units are required to report damage to any cavity tree or extensive soil disturbance within and around marked cavity tree buffers to Range Control. Range Control, as soon as possible after notification by the unit, will report this damage to the Fish and Wildlife Office, which will assess the damage. An artificial cavity will be constructed within 48 hours if a cavity tree is destroyed in an active cluster or provisioned recruitment cluster. Cavity trees destroyed in the SAIA, which will likely be discovered only by natural resources personnel entering clusters in this area, will be replaced when access long enough to construct replacements is permitted. Significant soil disturbance within or adjacent to marked buffers outside the SAIA will be repaired as soon as practicable to prevent degradation of RCW habitat. The Range Regulation will continue to require all digging for military training in the HMUs to be filled at the completion of training.

If the measures previously described fail to control damage and disturbance, trails and firebreaks located within the cluster may be closed by erecting gates and, if necessary, allowing these areas to re-vegetate. Fort Gordon will consult with the USFWS prior to the establishment of new trails, roads, or firebreaks that permit vehicle travel through an RCW cluster. Finally, habitat protection measures will be actively enforced through training and natural resources enforcement programs as described in Chapters 1 and 11 of AR 200-1.

4.1.7.6 Translocation and Augmentation

Both translocation and augmentation can involve intra-population (within the same population) or inter-population (between populations) movement of individuals.

Fort Gordon's RCW population is augmented through translocation efforts.

Augmentation is a specific form of translocation involving translocation of female juveniles. Inter-population translocation provides a means to maintain genetic viability in populations with less than 250 PBGs. Inter- and intra-population translocation can be a useful tool to expand and disperse the RCW population into designated habitat. They also permit biologists to increase the number of breeding pairs, thus increasing the rate of recovery via production of additional young. Normally translocation and augmentation involve movement of juveniles because the techniques for moving adults have proven less successful to date.

Fort Gordon will translocate and augment its RCW population in the following ways:

(1) Augment clusters containing individuals of one sex with one bird of the opposite sex from another population. Ideally, the birds should come from areas similar to Fort Gordon in latitude, elevation, and forest type (Haig *et al*. 1993, Haig and Rhymer 1994). However, individuals from other populations not meeting these requirements may also be used when birds are not available from preferred locations. This should provide additional breeding pairs and increase the genetic diversity of the population.

(2) Create new breeding groups by moving juvenile birds of the opposite sex into a recruitment cluster. New groups will be translocated into areas where provisioning has been accomplished and has the ability to support six recruitment clusters where three pair of RCWs can be released. This process is necessary in order to demographically stabilize the installation's small population. Efforts will be made to receive birds from different populations or as far apart as possible from the same population. Close coordination will be done with donor population biologist to insure genetic diversity. Creation of new breeding groups strictly by intra-population translocation may be possible when the population is larger. Fort Gordon will rely on experts and USFWS concurrence to determine when this is appropriate.

RCW will not be translocated into nesting habitat until a suitable number of cavities are available, midstory in the cluster or recruitment cluster has been controlled, and minimum forage is available. Until the population is considered stable (30 PBG), sites for translocation will generally follow the same priority as those identified for recruitment clusters (Appendix S). Exceptions include:

(1) Solitary birds will receive the highest priority for augmentation.

(2) Sites that were/have become recently inactive will receive high priority for re-activation translocation.

This priority scheme may be modified as appropriate by the installation's RCW biologist. Factors in addition to those listed above, such as quality of the nesting and foraging habitat must be considered when the final decision is made regarding cluster priority for translocation.

The group and/or cluster receiving a bird(s) will be monitored to determine the success of the translocation. Post-release monitoring will be performed to determine if pairs have formed, birds continue to use the cluster, and success of the translocation, as follows:

(1) Once a translocated bird is released, no further monitoring will be conducted for at least a week after the release to allow the bird(s) to become accustomed to its new cluster and to form a pair bond.

(2) Employ intensive monitoring during the next breeding season to document nesting effort and success. If still present, schedule groups for breeding season monitoring, including monitoring eggs, nestlings and fledglings.

(3) Translocations will be considered successful if birds remain in the population for 6 months, including a breeding season, or reproductive behavior or production of eggs, nestlings, or fledglings is observed.

Modifications to this monitoring scheme may be necessary if birds are translocated into direct fire or other limited access area.

Translocations will not be undertaken without the approval of and close coordination with USFWS and DPTMS. Prior to attending the Southern Range Translocation Cooperative (SRTC), Fort Gordon will discuss availability of habitat and potential number of birds for translocations. Fort Gordon has an ESA Section 10 sub-permit (scientific purposes) for RCW management, including translocations. Persons marking, banding, and handling birds shall have the appropriate permits prior to performing these activities, or be in the presence of permitted individuals. Permits will be kept current.

The goal for each of the next 5 years is to augment all single-bird clusters that meet requirements listed above and to create new breeding groups by translocating three pairs into sites containing six recruitment clusters. Additional translocations to Fort Gordon will depend on such factors as the availability of birds and the number of suitable recruitment clusters and habitat available. At a minimum translocation will be planned at least every other year; however, attempts will be made to translocate birds every year. Additional translocations will be actively pursued until the population consists of a minimum of 30 PBGs or all available recruitment clusters are active.

4.1.7.7 Monitoring Plan

The entire installation, except the AIA, was surveyed for RCW cavity trees from 1990 to 1992. Re-survey of the installation was completed in 1997 as required under the 1996 Army RCW Guidelines. Inventories of all managed clusters (active recruitment and selected historic), and group checks at those with cavity trees appearing active, are conducted annually to document the status of each cluster. Surveys, inventories, and monitoring are continuous.

The installation's wildlife biologist conducts routine monitoring of known RCW clusters at Fort Gordon.

Annual inspections of active clusters and provisioned recruitment clusters are needed to determine the management necessary to maintain nesting habitat. Monitoring the number of birds in active clusters will also be required to determine demographic trends within the population. Provisioned recruitment clusters will be group checked biannually to determine their status and if additional monitoring is required. Fort Gordon will annually report RCW population data and actions taken to improve RCW habitat to the USFWS. This information may be supplied in conjunction with a required Section 10 sub-permit report.

Forest stand inventories are needed periodically to properly manage the forest, including RCW nesting and foraging habitat. Forest stand inventories will be conducted according to accepted sampling techniques. Inventories on the ground will only be accomplished where deemed safe.

Project Surveys

Surveys are used to determine whether the nesting and/or foraging habitat of a RCW group will be adversely impacted by a proposed project, such as a timber sale or development activity, on a particular tract of land. This is an important part of the conservation

and management of this endangered species, and therefore the USFWS has developed standard survey and analysis procedures for such determinations. These determinations must be undertaken prior to the initiation of any project within the southeastern U.S. that calls for removal of pine trees 30 years or older; typically such trees will be at least 10 inches DBH or larger.

RCWs normally form new territories by "budding," which occurs when one territory is split into two (Ligon *et al.*, 1986, Copeyon *et al.*, 1991). Rarely do birds wander far from active territories to form new territories (Copeyon *et al.*, 1991). Walters (1990) stated that RCWs "appear to compete over existing territories rather than to colonize new ones". Copeyon *et al*. (1991) successfully created active clusters only when abandoned sites or new sites were provisioned with cavities. Hooper (1983) indicated that the distribution of some active clusters on the Francis Marion National Forest could not be explained by budding.

Fort Gordon's RCW population is located in the southeastern quadrant of the installation. With 13 active clusters, the population is small and currently not expanding naturally. Population growth will mainly occur in provisioned recruitment sites where the nesting and foraging habitat has been or is being improved and birds are provided via translocation.

The boundary of the project site is determined for each project by evaluating the impacts of the project to the area. For example, the project site to be surveyed for the construction of a range will consist of the area to be cleared for the range plus the surface danger zone for the weapons. The area to be adversely impacted is determined through consideration of such factors as the weapon systems involved, the type of berm constructed, and the topography of the site and its surroundings. In this case, the project site consists of the area where tree mortality is most likely to occur due to use of the range.

For all categories of projects other than, projects not requiring surveys and projects requiring surveys of only the project site, a survey of the project site will always be conducted if the project site itself has not been surveyed in the previous year. If the project site has been surveyed in the previous year, then a project site survey is not required. The only exceptions to this requirement concerns forest thinning projects and stands that have been provisioned for recruitment clusters. Forestry project sites generally cover larger acreages than construction projects; however, forestry projects are designed to provide better habitat for RCW. Natural resources

personnel will view pines in the project site during marking for thinning, and this will suffice as a survey of the project site. This procedure will also be considered an adequate survey of the stands to be harvested. Project site surveys for single-tree or group selection regeneration projects will be treated similar to a thinning as discussed above.

Surveys will not be conducted off-post. The relatively small amount of nesting habitat that exists around Fort Gordon generally has extensive hardwood midstory problems. The GADNR has not located any RCW clusters in the vicinity of the installation. Additionally, other Federal properties with RCW populations are not conducting surveys on surrounding private lands (Fort Gordon 2008a).

Not all of the varied projects conducted at Fort Gordon require surveys of the entire affected area. Projects at Fort Gordon are being placed in categories as discussed in the following subsections. For safety reasons, no surveys will be performed in the AIA (see Section 4.1.8.3).

Projects Not Requiring Surveys

Unless deemed necessary by a biologist, surveys will not be conducted for the following:

(1) Projects in unsuitable habitat for the RCW. Unsuitable habitat includes areas that are not nesting habitat and do not fulfill the definition of foraging stands in Section 4.1.7.2;

(2) Prescribed burning;

(3) Project sites not requiring pine tree removal;

(4) Projects that require only removal of pine trees less than 30 years old or less than 10 inches DBH. Removal of pines less than 10 inches DBH normally will have no adverse impact because RCW usually forage on larger pines (USFWS 2003) and cavities are not typically constructed in pines this small;

(5) Infrequently, pine tree removal for repairs and maintenance to utility lines and rights of way is necessary. In most cases, these repairs will occur in the developed cantonment areas. Personnel who perform these repairs and maintenance will have been trained to recognize marked cavity trees and not disturb them, and to remove only those trees absolutely necessary to complete the job. Some training on recognition of RCW cavities has been provided to help personnel

identify previously unknown cavity trees. A biologist will be contacted to properly identify suspected cavities. Surveys by trained personnel generally will not be performed prior to these repairs or maintenance; and

(6) Projects that occur inside the developed main and industrial cantonment area and are outside of the 49 numbered TAs identified on the Fort Gordon, Training and Doctrine Command Map Edition 003, Series 13055 Sheet Gordon, March 2007.

Projects Requiring Surveys of Only the Project Site

The RCW cavity tree survey to be performed for this category of projects involves inspecting the potential cavity trees to be removed only if these trees or the area where they occur have not been surveyed within the previous year. Projects include:

(1) Projects on the installation that requires removal of 150 feet x 150 feet (0.5 acres) or less in area and are more the 0.5 mile from an active cavity tree. Unless an RCW cavity is present, removal of such a small number of pines, which may be potential foraging habitat, is highly unlikely to adversely impact this endangered species.

(2) Timber salvage operations. Salvage will be limited to trees expected to succumb, unless the cause of tree damage is expected to spread, as may occur with disease or pest infestation. If spreading is expected, additional trees may be removed to curtail damage to surrounding areas. A wildlife biologist may determine that dying pines should be left standing if the disease or infestation is unlikely to spread, and the resultant snags will not create safety hazards. This determination may be made based on foraging habitat being at or below minimum requirements.

Projects Requiring Survey of the Project Site and Surrounding 0.5 Mile

Site specific surveys will be conducted for all proposed timber harvest, new construction, and maintenance actions that have not been discussed above and will require pine stem removal. All projects that occur within 0.5 mile of an active cavity tree will be surveyed with this method regardless of project size.

The first step in the survey procedure is to determine if suitable nesting or foraging habitat exists within the area to be impacted by the project. If no suitable nesting or foraging habitat is present within the project impact area, further assessment is unnecessary

and a "no effect" determination is appropriate. If no suitable nesting habitat is present within the project impact area, but suitable foraging habitat is present with 0.5 mile of the project and will be impacted, potential use of this foraging habitat by groups outside the project boundaries must be determined. This is accomplished by identifying any potential nesting habitat within 0.5 mile of the suitable foraging habitat that would be impacted by the project. Any potential nesting habitat is then surveyed for cavity trees. This procedure is described in greater detail below. If no active clusters are found, then a "no effect" determination is appropriate. If one or more active clusters are found, a foraging habitat analysis is conducted (see 8.I. of the RCW Recovery Plan) to determine whether sufficient amounts of foraging habitat will remain for each group post-project. All surveys will follow the methods described in Appendix 4 of the revised 2003 RCW Recovery Plan (USFWS 2003).

Inspections

Active, selected inactive and provisioned recruitment clusters will be inspected annually. These are prescriptive inspections used to develop treatments and modifications of treatments to maintain suitable nesting habitat. Inspections in the AIA will not be performed. At a minimum, Fort Gordon will inspect and record data for:

(1) Density and height of hardwood encroachment;

(2) Height of new RCW cavities;

(3) Condition of cavity trees and cavities;

(4) Damage from training, fires, etc.; and

(5) Evidence of RCW activity for each cavity tree, including each cavity in the tree, within the cluster.

Inactive clusters deleted from management will not be included in the annual inventory process. Clusters that have been deleted from management are shown in Figure 4-5.

Monitoring Programs

Fort Gordon will conduct monitoring programs to scientifically determine the demographic trends of the RCW population. Population monitoring will follow the Guidelines which states that all active clusters will be monitored annually in populations with less than 100 active clusters. Monitoring in the AIA will not occur.

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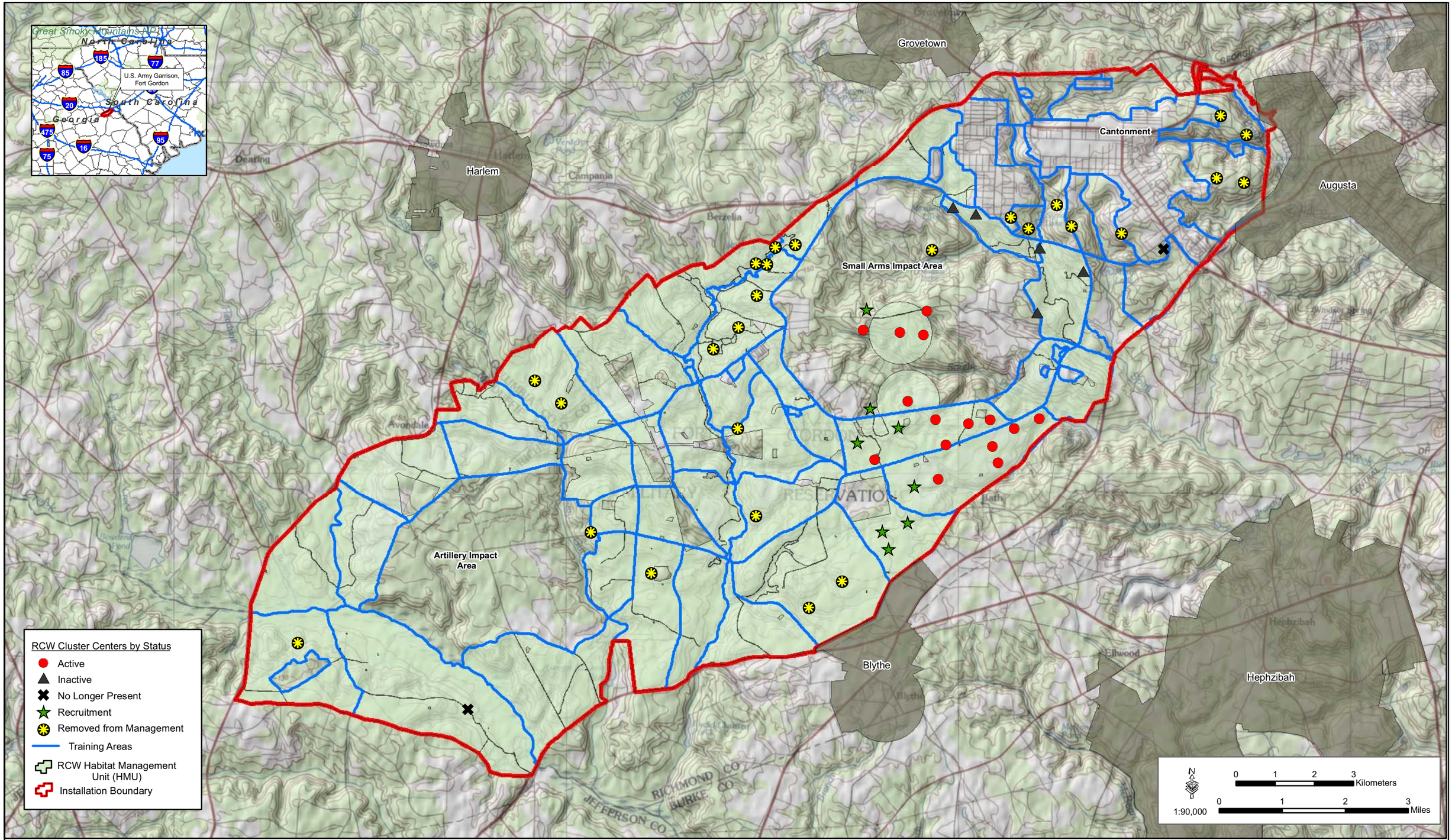

Figure 4-4: RCW Cluster Locations Classified by Status, Fort Gordon, Georgia

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Currently, Fort Gordon has only 15 active clusters; thus, all active clusters will be monitored for demographic trends. When the number of active clusters and PBG exceeds 100, 50 percent of the active RCW clusters will be monitored. Clusters activated by translocations will also be monitored. Monitoring activities will be performed annually to determine the number of adults and fledglings per site, sex of birds, number of breeding groups, and number of nests. Birds will be color banded to enable the monitoring of group size and reproductive success. Nestlings will be banded between the ages of 5 to 10 days old and will follow procedures in Appendix 2 of the revised 2003 RCW Recovery Plan (USFWS 2003). Monitoring results will be recorded and retained permanently for purposes of trend analysis.

Group checks of provisioned recruitment clusters inside the HMU will be performed twice per year during the late summer/fall and pre-breeding dispersal periods. Those in the SAIA will be checked at least once per year in accordance with the revised 2003 RCW Recovery Plan criteria to determine group size (USFWS 2003). These checks will determine which sites have been activated by natural dispersal. The newly-active recruitment clusters will be monitored as described in the previous paragraph.

Fort Gordon may monitor training activities occurring in all TAs inside the HMU that contain monitored active clusters and provisioned recruitment clusters through the RFMSS. This monitoring will occur irrespective of the status of the provisioned recruitment clusters. These data will help determine if training has any adverse effect on RCWs. The following data will be recorded:

(1) Type of training that occurred;

(2) Training duration;

(3) Training date;

(4) The units and approximate numbers of soldiers involved;

(5) An approximate number and types of vehicles and equipment involved; and

(6) Other relevant information that would contribute to an understanding of the effects of military training on the RCW or its habitat.

Sharing Data with USFWS

Fort Gordon will annually report, population data, all actions taken to recruit RCWs, and habitat improvement measures, to the USFWS. Information similar to that contained in Appendix 2 of the

Guidelines will be reported, with some modifications (Appendix H). For example, no unprotected clusters are located on Fort Gordon and group checks will be used to monitor status of provisioned recruitment clusters instead of visual inspections of cavities. Population data will be analyzed for trends and reported to the USFWS annually. Data gathered before the initiation of this plan will serve as a baseline for comparison to future data and will help identify trends. Trend analysis will be conducted at least once every 5 years after population stabilization.

The Guidelines call for the U.S. Army to work closely and cooperatively with the USFWS to discuss installation RCW conservation. Fort Gordon will routinely engage in informal consultation with the USFWS to ensure that proposed actions are consistent with ESA requirements. When data suggest that Fort Gordon's population is declining, the USFWS will be consulted to determine if another course of action is needed to prevent further decline. If needed, a new plan will be developed in consultation with the USFWS. Fort Gordon will also consult with the USFWS if over a period of several years, the installation is accomplishing less than 50 percent of the population growth goals noted in this ESMC.

Ten-year Forest Inventory

In addition to surveys, Fort Gordon will conduct an installation-wide forest inventory at least every 10 years, as required by AR 200-1. Alternatively, Fort Gordon may inventory 10 percent of the installation annually. Information about the quantity and quality of available foraging, nesting habitat and ground cover required for use in the RCW matrix will be collected during the forest inventory. Forest inventories will be conducted using a recognized plot sampling technique, such as a line plot cruise, a point sample cruise, or line strip cruise method. Forest inventories in the AIA may be conducted using aerial photography interpretation methods.

4.1.8 Management of the Cantonment, Impact, Dud, and Direct Fire Areas

Fort Gordon has designated the RCW HMU to contain enough existing or potential nesting and foraging habitat to attain and sustain the installation's RCW population goal. Fragmentation of nesting habitat was avoided in designating the HMU and corridors will connect all nesting areas allowing for demographic interchange throughout the installation population. Delineation of the HMU is an important initial step in the planning process because it influences the future geographic configuration of the installation RCW population. Updating the HMU will be an ongoing process and the

areas designated as HMUs will be managed according to this ESMC.

Management activities and practices in the HMU will be consistent with the conservation of other Federally listed species and those proposed for listing. Conservation of candidate species and Army Species at Risk (SAR) will be considered to the extent possible. Fort Gordon will consult with the USFWS should conflicts between management of the RCW and another Federally listed species arise.

Only the HMU land area can be managed within the standard management practices described in previous sections of this plan in support of the population goal. However, there are areas of the installation that could support RCWs but management of the species is limited in some way that does not allow Fort Gordon to manage in compliance with the standards. These areas include dud areas, the AIA, the SAIA, and the cantonment area, collectively known as limited management areas. These areas will be managed in a fashion similar to safe harbor on private land. The RCW will not be intentionally partitioned in these areas and incidental take will be given for all naturally occurring disbursement of RCW to areas outside the HMU. Incidental takes are discussed in detail in Section 4.1.15.2.

This section addresses the specific management actions for the dud areas across the installation, the AIA, the SAIA and the cantonment area. Natural resources management in these areas will follow ecosystem management principles and have some elements of RCW management but are limited in some way and therefore not included in the HMU. Safety of personnel is the primary consideration behind the management decisions for these areas. The hazardous conditions resulting from management actions such as prescribed fire near the cantonment, TAs, the concentration of un-exploded ordnance (UXO) and other hazardous materials (radiological and toxic chemicals) in these areas, pose a high risk to personnel.

4.1.8.1 SAIA

The SAIA, containing approximately 7,500 acres, is the largest direct fire area outside the AIA. This area also includes 12 small arms ranges, a shoot house, the sportsman's ranges and complex and 214 acres of dud area.

Due to new range construction, increased weapons firing requirements, dud areas and surface danger zones, access to the

majority of the SAIA is restricted most of the year. The limited amount of time to work in this area without conflicting with the military mission caused DPTMS to request that no additional recruitment clusters be provisioned in the SAIA. However, while this area is not included in the HMU or the IPG, there is habitat that could potentially be used by RCW within the SAIA. With approval from Range Control to enter the SAIA and as the mission allows, RCW management activities will be managed in the SAIA in the following ways:

- Maintain and monitor the two active clusters, forage and midstory that are included in the HMU according to RCW guidelines;
- Midstory removal for cluster and forage habitat will be conducted with a combination of fire, mechanical, or chemical control;
- Conduct prescribed burns on the entire SAIA on a minimum 3 year rotation;
- No new recruitment clusters will be established inside the SAIA;
- Maintain existing recruitment clusters to the extent possible as access allows; and
- Timber management will follow the HMU, the Guidelines and revised 2003 RCW Recovery Plan (USFWS 2003).

As missions continue to change the ability to access and manage the SAIA, the SAIA will be re-evaluated annually for inclusion in future ESMC plan revisions.

4.1.8.2 Cantonment Area

The cantonment area includes administrative areas, barracks, housing, classroom buildings, and fixed field training sites that augment the classroom instruction. The metropolitan area outside this part of the installation is also the most developed and encroached upon. Due to high numbers of people and buildings, both on and off the installation, management with fire is difficult in this wildland urban interface. There will be only occasional fire and no midstory or other habitat improvement work beyond timber harvest in the cantonment. Additionally, no new recruitment clusters will be established in the cantonment area. Master planning calls for development and expansion of buildings to occur in this area partially due to the proximity of other infrastructure (roads and utilities) and other similar facilities.

4.1.8.3 AIA

Range Control and the safety office must approve entrance into the AIA prior to management in this area. The AIA contains unexploded artillery, mortar rounds, and other types of UXO. Several target engagement sections of this impact area have a high concentration of duds and continue to receive rounds that may produce additional UXO. Conservation benefits to be gained by management, other than prescribed fire, in high risk areas are not justified and shall not be pursued in these areas.

To the best of our knowledge, the AIA does not contain any active RCW clusters at this time, although some RCW habitat, including one inactive cluster, has been identified. Surveys for new cavity trees will not be conducted in the AIA. Current management strategies for RCW does not include establishment of recruitment clusters in this area. No soil disturbing activities, including those requiring use of vehicles, will be performed in the AIA.

Prescribed burns to reduce fuels available to wildfires are conducted annually during the non-growing season to minimize the possibility of a severe wildfire. Prescribed burning of the majority of this impact area is restricted to the non-growing season because large sections must be burned at one time. Burning is the only management action that will be preformed in the AIA. To complete this large fire in 1 day, Fort Gordon personnel burn the AIA using a ring-fire technique.

4.1.8.4 Dud Areas

Management of other areas containing UXO will be similar to that described for the AIA, with the exception of the burning regime. Burning will be conducted in appropriate stands every 3 to 5 years if considered safe. For safety reasons, personnel burn only from the edges of the road and are prohibited from leaving the road to set additional backfires or inspect the effects of a burn.

4.1.8.5 Metal Damaged Areas

Clusters and surrounding foraging area in the AIA and inside the SAIA will be designated as "no fire areas" to the degree practicable to protect clusters from projectile damage. Habitat protection, such as additional berms behind certain ranges, will be employed if practical.

Forest stands adjacent to the AIA and inside the SAIA that have been heavily damaged by small arms fire and continue to receive contamination have been deleted from the HMU. These areas are

not considered manageable for the long-term. Areas protected from significant damage in the future, by such measures as construction of berms, which will support pine or pine-hardwood stands will be added to the HMUs if management of these sites is practical.

4.1.9 Special Considerations

4.1.9.1 Inactive Cluster Deletions

Deletion of all inactive clusters not appropriate for recruitment in the next 10 years will prevent problems in managing the RCW population on Fort Gordon. For example, where current foraging habitat and that which can be developed in the next 5 years will not support both an inactive cluster(s) and a more suitable recruitment cluster, deletion of the inactive cluster(s) is the best option. The inactive cluster(s) can become a recruitment cluster when the appropriate habitat is developed, if it is the best choice at that time. Current inactive clusters not in the HMU and those located within the HMU that have been monitored inactive for more than 5 years and are not planned for recruitment in the next 5 years will be permanently deleted from management (see Figure 4-5). In this case, deletion of inactive clusters will be used to direct the RCW population away from critical training missions and dud areas where safety concerns will not permit proper management of the clusters. Cluster deletion in these areas will also permit resources to be directed where maximum benefits to the RCW will be realized. Protection of deleted clusters is discussed in Section 4.1.7.1.3 of this document.

Cavity trees in deleted clusters may be protected or removed as deemed necessary by the installation's RCW biologist. In addition, cavity entrances will not be covered unless reactivation of the inactive cluster would be harmful to RCWs, or the cluster is not in an HMU and reactivation would create problems with critical missions. Clusters deleted from management will not be included in the annual inventory process.

4.1.9.2 Incidental Take

Incidental take of an RCW, both directly and through removal of habitat, could occur during management activities designed to conserve this species. During consultation with the USFWS, Fort Gordon will request incidental take of RCWs for the following management activities:

- Prescribed Burning. Individual RCWs, nests containing eggs and/or nestlings, cavity trees, and foraging habitat can be

injured or destroyed as the result of prescribed burning. Measures taken to prevent damage or destruction to RCWs and/or cavity trees include raking or burning around cavity trees and the use of water and fire retardant materials. Foraging habitat is protected during prescribed burns by following the burn plan (see Section 4.16). The burn plan describes parameters such as weather and fuel conditions and equipment and personnel required to accomplish prescribed burn objectives that do not adversely affect RCW habitat. Even with these precautions, local weather changes, higher-than-estimated fuel loads, and other unforeseen factors may cause escaped prescribed burns or out-of-prescription burns. Measures will be taken to extinguish prescribed burns that are out of prescription. Fire plows will be used in clusters only during emergency situations. The presence of unexploded ordnance in the AIA and dud areas prevents the use of reasonable and prudent fire protection measures such as raking or burning around cavity trees. Standard fire suppression activities cannot be performed within the AIA and wildfires are controlled at the perimeter of the AIA only. Fort Gordon has requested two incidental takes for any losses as a result of prescribed burning. This take may be in the form of harass, harm, wound or kill, loss of nest, active cavity, or adult. The Biological Opinion (BO) will give further information on take status.

- Activities Outside the HMU (dud, AIA, SAIA, and cantonment area). Incidental take of RCW and/or RCW cavity trees will be requested during formal consultation procedures with USFWS and will be addressed in the BO. No specific number of takes is requested but rather incidental take is requested for all area outside the HMU including dud, AIA, SAIA, mission essential and cantonment areas. Fort Gordon will manage these areas in a similar manner as safe harbor on private lands. Natural dispersal of RCW into these areas will not be discouraged, but if birds populate the area and mission requirements require the birds or habitat to be removed, there will already be a take in place.
- Activities Inside HMU. Approximately 24,300 acres are identified as the HMUs with the intent of producing habitat capable of supporting 122 PBGs on Fort Gordon. Some RCW and/or RCW cavity trees would be expected to be affected on occasions through training and land management activities when RCWs begin to naturally disperse in this area. Fort Gordon requests one incidental

take for training or other accidental take of a RCW or cavity tree within the HMU for the life of this plan. This take may be in the form of harass, harm, wound or kill.

Installation staff will immediately notify their major command and the USFWS in the event of an incidental take. Fort Gordon will also comply with paragraph 4-3 of AR 200-1.

4.1.10 Ecosystem Management

Conservation of the RCW and other species is part of a broader goal to conserve biological diversity on U.S. Army lands consistent with the U.S. Army's mission. Biological diversity and the long-term survival of individual species such as the RCW ultimately depend upon the health of sustaining the longleaf pine ecosystem; therefore the success of Fort Gordon's ESMC depends on the integrity of the longleaf pine ecosystem integrity. Management of this ecosystem will benefit a variety of species, including the RCW. Maintenance of ecosystem integrity and health also benefit Fort Gordon, U.S. Army, and the Nation by preserving and restoring training lands for long-term use.

4.1.11 Maintaining the HMU

One of the major challenges Fort Gordon will face over the long-term is maintaining the size and location of the HMUs. The main reason is the HMUs were designed with knowledge of short-term mission requirements. The current mission of the military is in a state of flux and consequently the short-term mission requirements of this installation are subject to change. Grow the Army actions might occur that could impact mission requirements within the HMUs.

Should a significant threat to our National security occur, Fort Gordon would have to expand facilities to train additional soldiers. Plans for expanding this training base will continue to change with Grow the Army actions pending and realignments occurring. The extent of development of facilities in the HMUs required beyond the current plan is unknown at this time, but portions of the HMUs would likely be involved. In the event that training base expansion is required, Fort Gordon will consult with USFWS regarding potential adverse impacts to the RCW.

Unplanned projects are likely to occur in the HMUs. Consultation with USFWS regarding a change to the HMUs will not be initiated unless the cumulative unplanned removal in 5 years exceeds 200 acres of the HMU. Projects requiring removal of less than 0.5 acre

of an HMU will not be included in these calculations. Consultations will be conducted on situations potentially affecting active clusters, recruitment clusters, or their foraging habitat outside the scope of this ESMC. Consultations will be initiated before major construction projects in the HMUs, such as new ranges, are initiated. Annual total HMU removal will be reported to USFWS and the ESMC, including the HMUs and resultant population goal, will be revised after every 5 year period.

4.1.12 Regional Conservation

The interests of Fort Gordon and the RCW are best served by encouraging conservation measures off the installation. Fort Gordon has participated in efforts by the RCW Conservation Coalition to conserve RCWs and longleaf pine habitat on private lands in Georgia. Fort Gordon will continue to participate in promoting cooperative RCW conservation plans, solutions, and efforts with other Federal, state, and private landowners in the surrounding area.

4.1.13 Conservation on Adjacent Lands

Necessary habitat for the RCW includes nesting and foraging areas. Both of these habitat components for a given cluster may be located entirely on installation lands, or there may be instances where one of these components is located on installation lands and the other is located on adjacent or nearby non-Army land. The USFWS and Fort Gordon will initiate cooperative management efforts with these landowners, if such efforts would complement installation RCW conservation initiatives.

4.1.14 Cooperation with the USFWS

Fort Gordon will work closely and cooperatively with USFWS on RCW conservation and ecosystem management. The installation will routinely engage in consultation with USFWS to ensure that proposed actions are consistent with ESA requirements. Consultation, if necessary, will occur prior to any significant changes to this plan. Fort Gordon will work closely with USFWS on the installation or its surroundings to ensure adverse impacts to mission requirements are minimized and the best options for conservation of this endangered species are considered.

In situations of a catastrophic event such as a tornado or hurricane, Fort Gordon will make every effort to coordinate with USFWS to the best of its ability to recover the RCW. This will be coordinated through USFWS, GADNR, DPTMS, and the Fort Gordon Garrison to ensure this process.

4.1.15 Effects on Training

Implementation of this management plan will have positive and negative effects on training in the short-term. Deletion of inactive clusters near critical training areas, especially if cavities are covered, should reduce the possibility of conflicts at these sites. Deletion of other inactive clusters will also permit training in these areas. Incidental take authorization will eliminate training related liability of personnel for accidents that may occur outside the HMU. Management practices outlined within the framework of this document will be utilized in the assessment of changes in mission requirements that could potentially impact RCW habitat. Projects that conflict with current habitat may not receive final approval. If too many off-site species timber stands are cleared within a short period of time for species conversion, field training dependent on a forested setting may be adversely affected due to the lack of mature forested areas.

Planning will require close coordination between natural resources personnel and trainers to ensure any adverse effects are minimized. This will be accomplished through the INRMP and its annual work plan. At times, the specific location of clusters interferes with field exercises designed to simulate battle conditions. However, this is not a major impediment to training and may actually increase the effectiveness of the training by requiring commanders to be creative in overcoming this "obstacle," just as they would have to overcome obstacles encountered in battle.

The INRMP's effect on training in the long-term is more difficult to predict because of unforeseeable changes. There will be more PBGs where limitations on training may occur. The recruitment clusters identified in this section are considered long-term recruitment clusters and may change in priority as new clusters occur or as habitat becomes available. Because the potential for clusters to affect certain types of field training exercises does exist, research is being conducted to determine the effect of certain training activities on RCW behavior. Restrictions may be lifted if the results of this research indicate that the activities have no adverse effect on RCW.

Time required to review projects planned in or near the HMUs may increase as the number of active clusters increases. This is due, for example, to the more frequent cavity tree surveys that will be required. One benefit to Fort Gordon may be that certain training restrictions will be relaxed or removed as the population increases.

4.1.16 Target Species

Target species for the purpose of this plan refers to Federally endangered or threatened species, species of concern, state-listed species, and state-tracked species. A list of target species on Fort Gordon is provided in Section 2.3.1. Two of the target species, gopher tortoise Pickering morning glory are considered SARs on Fort Gordon by the U.S. Army and require special management consideration to prevent further degradation of the species or its habitat which could result in listing under the ESA. Management of SARs on Fort Gordon follows the guidance and requirements provided in the U.S. Army's memorandum, *Army Species at Risk Policy and Implementing Guidance* (15 September 2006). This memorandum is provided in Appendix H. Management summaries for several of the target species, including SARs, on Fort Gordon are provided in Appendix H. Additionally, a management plan for three target fish species, bluebarred pygmy sunfish, Savannah darter (*Etheostoma fricksium*), and mud sunfish (*Acantharcus pomotis*), on Fort Gordon is provided in Appendix H. Further, the Fish and Wildlife Section will continue to maintain nest boxes for the southeastern American kestrel, a Federal Species of Concern, on the installation. The location of kestrel nest boxes on the installation are provided in Figure 4-5

In 2008, the U.S. Army released the final Management Guidelines for the Gopher Tortoise (2008 Gopher Tortoise Guidelines, Appendix H). The guidelines establish baseline management standards for U.S. Army installations to support the conservation of the gopher tortoise and its habitat. Fort Gordon will implement the 2008 Gopher Tortoise Guidelines as part of the INRMP. In accordance with the 2008 Gopher Tortoise Guidelines, Fort Gordon has established a HMU for the management of the gopher tortoise (Figure 4-6). Management activities for the next 5-year period will include conducting population surveys for the gopher tortoise and monitoring the gopher tortoise HMU. Further, Fort Gordon's ecosystem based management strategy and management for the RCW has and will continue to benefit the gopher tortoise and its habitat. In a study conducted by the USACE, Construction and Engineering Research Laboratory, it was determined that management standards and targets established in the 2003 Revised RCW Recovery Plan were consistent with gopher tortoise management (Tuberville 2007). Both species benefit from longer timber rotation, lower stem density, frequent growing season burns, and replacement of offsite pines with native pines.

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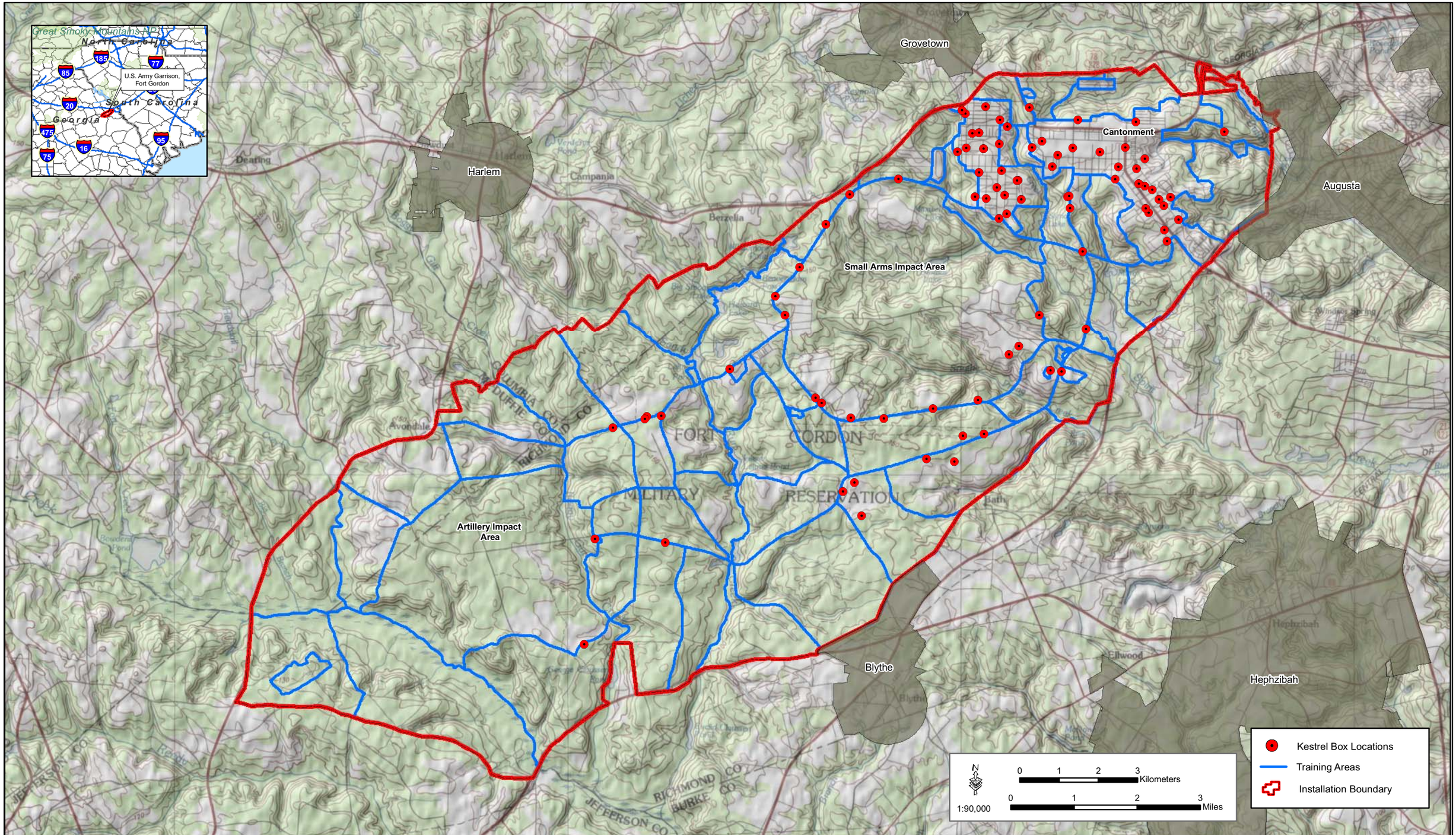

Figure 4-5: Kestrel Box Locations, Fort Gordon, Georgia

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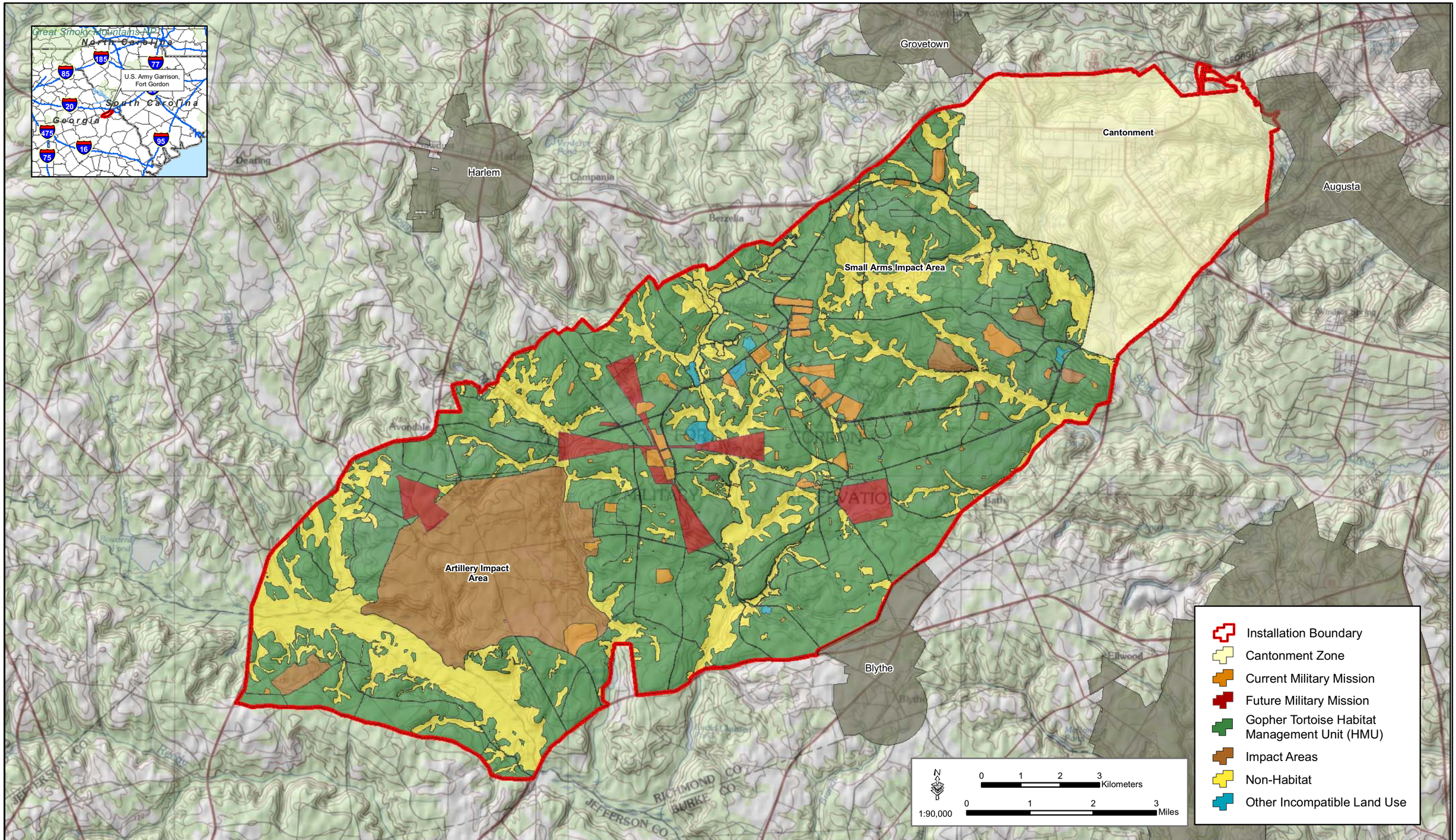

Figure 4-6: Gopher Tortoise Habitat Management Unit

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4.1.17 Resources Required

The initial planning and funding period for the implementation of this ESMC is 5 years, though some components extend beyond this time frame. Projected annual costs and estimated staffing requirements for implementation of the INRMP, including the ESMC are presented in Section 5.0. In addition to the required staff, assistance from other agencies and contractors will be required to implement all the tasks outlined in this ESMC. Assistance is required in performing annual surveys for cavity trees, reforestation activities, habitat improvements, prescribed burning, and translocating RCWs to Fort Gordon. Equipment needed to support implementation of this plan is accounted for within ED. Additional equipment needs identified will also be obtained and accounted for by ED.

4.2 WETLANDS, FLOODPLAINS AND DEEP WATER HABITATS MANAGEMENT

The discussions on Wetlands and Deep Water Habitat, and Floodplains have been consolidated into one discussion for the purpose of this INRMP. This is a slight modification from the DoD INRMP template that suggests separate discussions for Wetlands and Deep Water Habitat, and Floodplains. This modification was done to consolidate all water resources into one section.

4.2.1 Objectives

Wetlands, floodplains, and stream buffers are critical in the protection and maintenance of living resources. Wetlands are also important in the protection of surface waters in accordance with the Rivers and Harbors Act of 1899; Executive Order (EO) 11990, Protection of Wetlands; Sections 401 and 404 of the CWA; and presidential policy mandating “no net loss” of wetlands (National Policy Issuance #91.01, Wetlands). Meeting the President’s Challenge, the U.S. Army has a mandate to protect wetlands, to the maximum extent practicable. The following regulations, laws and EOs are pertinent to wetlands, floodplains, and stream buffers for the state of Georgia:

- EO 11990 Protection of Wetlands
- Section 401 of the CWA
- Section 404 of the CWA
- Coastal Zone Management Act of 1972
- EO 11988—Floodplain Management

U.S. Army policy is to avoid adverse impacts to existing aquatic resources and offset those that are unavoidable. The U.S. Army’s

goal is no net loss of values and functions to existing wetlands and no overall net loss of wetlands on U.S. Army controlled lands. Furthermore, the U.S. Army takes a progressive approach to protecting existing wetlands, rehabilitating degraded wetlands, restoring former wetlands, and creating wetlands to increase the quality and quantity of the Nation's wetlands resource base. Similarly, EO11988–Floodplain Management addresses floodplain impacts, and the Coastal Zone Management Act mandates consistency with state coastal zone regulations, if applicable. Fort Gordon is not within the Georgia coastal zone; therefore, there is no compliance issue with this resource.

4.2.2 Wetland Management

Fort Gordon will identify and maintain a current inventory of wetlands and surface water resources through Planning Level Surveys. A Memorandum dated 21 March 1997, Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and INRMP provides guidance for planning level surveys. The following steps will be taken to mitigate the effects of specific projects on wetlands:

- Through NEPA and Watershed Impact Assessment, decide whether alternatives are available that do not impede wetlands. Avoiding or reducing the amount of wetlands affected by the action often economically benefits the U.S. Army.
- The USACE Savannah District will determine the boundaries of affected wetlands through wetland delineation in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual*. Assemble all pertinent associated material, including aerial images and maps (topographical, etc.).
- When all wetland information is assembled, request that the USACE determine whether the wetland is jurisdictional and whether a Section 404 Permit is required. If the site requires a Section 404 Permit, a detailed design and permit application will be prepared and the Section 401 Water Quality Certification application will also be submitted.
- If the wetland is jurisdictional, obtain a Section 404 permit from USACE before performing any work associated with the discharge of dredged or fill material into the wetland.

- If the wetland is isolated, USACE does not have jurisdiction. The state Water Quality Certification will still be completed under their jurisdiction.
- During the planning stages and NEPA process, determine whether any other laws or regulations apply to a proposed action in a wetland. This focuses on the ESA and MBTA. Regarding the ESA, if an action may affect a listed species, consult with USFWS.
- Determine whether a Nationwide Permit might apply to the intended action.
- Determine whether the state requires a Section 401 Water Quality Certification and or the locality has individual permit requirements related to watershed, wetland, or stream quality.
- If the project requires Section 404 permits, demonstrate avoidance and minimization of wetland impacts followed by mitigation as a last resort, per the Memorandum of Agreement (MOA) between USACE, Environmental Protection Agency (EPA), and USFWS.

Fort Gordon's environmental staff maintains protective buffers around wetlands to improve water quality and minimize impacts to wetlands and stream channels from stormwater discharge from impervious surfaces such as runways and roads.

4.2.3 Floodplains Management

EO 11988 requires all Federal agencies to provide leadership and take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of Federal lands. Prior to implementing a proposed action Fort Gordon's planners consult the National Flood Insurance Program (NFIP) maps distributed by the Federal Emergency Management Agency (FEMA) to determine if the proposed action occurs in a floodplain. If NFIP maps do not cover the affected area, a professional engineer prepares floodplain map contours. Fort Gordon implements the floodplain requirements through planning review and stormwater management programs. The erosion and sediment programs of the state and local issuing authorities review all development and prevent construction of structures from within critical floodplains. Additionally, Fort Gordon Hydrologic/Hydraulic Study maps and the project's storm magnitude severity are reviewed to determine potential impacts to floodplains. The following steps are taken to minimize impacts floodplains.

- Through NEPA and Watershed Impact Assessment, decide which projects are located in a floodplain. Investigate alternatives that are available to relocate or prevent life, health and safety issues that are potentially located in a floodplain.
- Fort Gordon staff, contract personnel, and/or Local Issuing Authority under the Georgia Erosion and Sediment Act will determine the boundaries of the floodplain in accordance with the Fort Gordon Hydrologic/ Hydraulic Study or the FEMA Floodplain maps.
- Assemble all pertinent associated material, including aerial images and maps (topographical, etc.).

4.2.4 Deepwater Habitat

As previously mentioned in Section 2.3.2 (Wetlands and Deep Water Habitats) a total of 30 impoundments are located on Fort Gordon. Three of the impoundments, Maxwell, Thomas, and Scout lakes, had dam failures in 1990 and have not been repaired to date. The Fort Gordon Fish and Wildlife Section is responsible for the management of the impoundments on the installation and management guidelines are provided Section 4.4.6 of the Fish and Wildlife Plan.

4.2.5 Stream Buffer Management Zones

Streams and creeks on Fort Gordon are protected under the Georgia Erosion and Sedimentation Act 391-3-7. Streams must have a 25-foot wide undisturbed vegetative zone to protect the waters of the state. The state provides variances to this requirement only under permits granted by the Georgia National Pollution Discharge Elimination System (NPDES) program. The variances are required for activities that disturb the riparian areas along the streams. The following steps will be taken to avoid and minimize the effects of specific projects on Fort Gordon's streams and creeks:

- Permit all activities requiring variances
- Map all streams with buffers

4.3 ENFORCEMENT OF NATURAL RESOURCES LAWS AND REGULATIONS

Section 107 of the Sikes Act (16 U.S.C. 679e-2), requires, to the extent practicable and using available resources, professionally trained natural resources management personnel and natural resources law enforcement personnel to be available and assigned

responsibility to perform tasks necessary to carry out Title I of the Sikes Act, including the preparation and implementation of INRMPs.

The Provost Marshal is responsible for enforcing laws and regulations on Fort Gordon, including those pertaining to hunting and fishing, and other natural resources recreation. The responsibilities and policies for hunting, fishing, trapping, and horseback riding on Fort Gordon are established in USASC&FG Regulation 420-5 (Appendix I). Specific responsibilities of the Fort Gordon Game Warden Section are listed below.

The Provost Marshal is responsible for enforcing laws and regulations on Fort Gordon.

- Enforce Federal, state and installation laws and regulations pertaining to fish and wildlife, and boating safety.
- Record game kills and maintains other records to ensure compliance with season bag limits.
- Patrol woodlands and waters of the installation to enforce laws and regulations pertaining to fish and wildlife, boating safety, endangered species, and illegal dumping.
- Execute warrants pertaining to the violation of laws and regulations regarding fish, wildlife, and hunting, fishing or boating.
- Seize and take possession of all wildlife or parts thereof taken, caught, killed, captured, possessed or controlled in any manner or for any purpose contrary to the laws and regulations pertaining to fish and wildlife.
- Seize as evidence, without warrant, any device other than a boat, vehicle or aircraft when there is probable cause to believe that its possession or use is in violation of any provisions of laws or regulations dealing with fish and wildlife.
- Arrest, if necessary, without arrest warrant any person found violating laws or regulations pertaining to fish, wildlife, hunting, fishing or boating.
- Recommend and enforce suspension of access privileges for specified infractions of laws and regulations pertaining to fish, wildlife, hunting, fishing and boating.
- Ensure cooperation between the DES and the DPWL Fish and Wildlife Section for the proper completion of wildlife law

enforcement duties and responsibilities.

- Coordinate with other state and Federal law enforcement agencies as necessary for the proper completion of wildlife law enforcement duties and responsibilities.
- Ensure Fort Gordon wildlife law enforcement personnel are qualified and trained to carry out all assigned duties and responsibilities.
- Provide sufficient equipment to support the wildlife law enforcement program for proper completion of program responsibilities.

A number of laws and regulations apply to the natural resources management at Fort Gordon. Table 4-3 lists the Federal laws and regulations applicable to Fort Gordon.

Table 4-3. Laws, Regulations, Executive Orders, and Instructions Applying to Natural Resources Management at Fort Gordon

NUMBER	TITLE	DESCRIPTION (where necessary)
PL 65-186 (16 USC 703)	Migratory Bird Treaty Act, as amended	Prohibits taking or harming a migratory bird, its eggs, nest, or young without the appropriate permit
PL 85-337 (10 USC 2671)	Military Reservation and Facilities - Hunting, Fishing, and Trapping	Provides that hunting, fishing, and trapping on military lands will be in accordance with state laws.
PL 86-624 & 96-366 (16 USC 661 et. seq.)	Fish and Wildlife Coordination Act, as amended	Provides for effective integration of the fish and wildlife conservation programs with Federal water resource development and construction projects having impact on water resources.
PL 86-797 (16 USC 670a – 670f)	Sikes Act as amended by PL 99-561	Requires each military department manage natural resources, including all fish and wildlife species, in accordance with a tripartite cooperative plan agreed to by USFWS and state wildlife agency; to train personnel in fish and wildlife management, and prioritize contracting work with Federal/state agencies.
PL 88-29 16 USC 2901et. seq.	Outdoor Recreation Program/ Organic Act	Requires consultations with the National Park Service regarding management for outdoor recreation.
PL 89-669 (16 USC 2901 *et seq*.)	Fish and Wildlife Conservation Act	Provides for conservation, protection, restoration, and propagation of native species of fish and wildlife, including migratory birds threatened with extinction.
PL 90-542	Wild and Scenic Rivers Act	Requires identification and protection of any river or stream that qualifies under the Act.
PL 90-543	National Trails Systems Act of 1986	Promotes development of recreational, scenic, historic trails for persons for diverse interest and abilities.
PL 91-190 42USC4321et. seq.	National Environmental Policy Act, as amended	Preserves important natural aspects of National heritage and enhance quality of renewable resources.
PL 92-500	Federal Water Pollution Control Act	Regulates dredging/filling of wetlands and regulates nonpoint sources into waterways
PL 92-205	Endangered Species Act (ESA)	Provides for the identification and protection of threatened and endangered species and critical habitats

Table 4-3, continued

NUMBER	TITLE	DESCRIPTION (where necessary)
PL 93-639	Nongame Species Act	Encourages management for nongame species
PL 93-639	Federal Noxious Weed Act	Establishes control and eradication of noxious weeds and regulates them in interstate and foreign commerce
10 USC 2665	Military Construction Authorization Act - Sale of Certain Interest in Lands; Logs.	The sale of forest products is authorize to finance the cost of managing forest resources for commercial production
10 USC 2667	Leases; Non-Excess Property	Provides for outleasing public lands for agricultural purposes and retention of cash receipts for administration of the program; improvement of existing leased areas; preparing new areas for outleasing.
16 USC 590a	Soil Conservation Act	Provides for application of soil conservation practices on Federal lands.
16 USC 668 et seq.	Bald and Golden Eagle Protection Act	Prohibits the taking (harassment, sale, or transportation) of bald or golden eagles, alive or dead, whole or parts, nest and/or eggs.
42 USC 1962d	Water Resources Planning Act of 1965, as amended	Provides for the optimum development of the Nation's natural resources through water resources planning.
PL (PL) 1972	Federal Insecticide, Fungicide, & Rodenticide Act	Governs the use and application of pesticides in natural resources management programs
PL 56-510 42 USC 9601	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	As amended by Superfund Amendments and Reauthorization Act (SARA) of 1986, CERCLA establishes programs for the cleanup of hazardous waste disposal and spill sites nationwide. Requires protection of human health and the environment.
PL 101-380 33 USC 2701	Oil Pollution Act of 1990 (OPA 90)	Redefines requirements of the National Contingency Plan (NCP) to include planning for rescue of, minimization of injury to, and assessment of damages/injury to fish and wildlife resources
PL 94-580 42 USC 6901	Resource Conservation and Recovery Act	Limits landfills, stimulus for recycling, regulates handling and disposal of solid wastes, regulates underground storage tanks
PL 91-604 42 USC 7401	Clean Air Act	Regulates emissions, delegates authority to regulate prescribed burning to the states
5 USC 51	Administrative Procedures Act	Allows public to sue to enforce other laws or for not following established procedures or other abuse of discretion
5 USC 552	Freedom of Information Act	Must provide access to the public for most Federal documents
P.L. 101- 511 section 8120	Defense Appropriations Act of 1991 Legacy Program	Establishes program for stewardship of biological, geophysical, cultural and historic resources on DoD lands
40 CFR 300.600 40 CFR 300.615	Natural Oil and Hazardous Substances Pollution Contingency Plan, Designation of Federal Trustees, Responsibilities of Trustees	Requirements of the National Contingency Plan (NCP) to include planning for rescue of, minimization of injury to, and assessment of damages/injury to fish and wildlife resources.
50 CFR 1-end	Wildlife and Fisheries	50 CFR 402 Inter-agency Cooperation – Endangered Species Act of 1973, 50 CFR 10.13, List of Migratory Birds
EOs 11514 and 11991	Protection and Enhancement of Environmental Quality	Directs issuance of instructions and guidelines relative to preparation of EIS

Table 4-3, continued

NUMBER	TITLE	DESCRIPTION (where necessary)
EO 11990	Protection of Wetlands	Requires agencies to take action to minimize destruction, loss, or degradation of wetlands.
EOs 11989/12608	Off-Road Vehicles on Public Lands	Provides for closing areas to off-road vehicle use where natural resources are adversely affected
USASC&FG Reg 420-7	Endangered Species Regulation	This regulation provides guidance to U.S. Army Signal Center and Fort Gordon (USASC&FG) on activities in proximity to endangered species sites.
USASC&FG Reg 420-5	Hunting, Fishing, Trapping, and Horseback Riding Regulations	Establishes responsibilities and policies for hunting, fishing, trapping, and horseback riding on the Fort Gordon military installation.
USASC&FG Reg 200-2	Environmental and Natural Resources Management	Establishes policies and procedures and assigns responsibilities for the preservation, protection, restoration, quality, and enhancement of the environment in assuring military mission accomplishment at Fort Gordon.
AR 215-2	Management and Operation of Army Morale, Welfare and Recreation Programs and Nonappropriated Fund Instrumentalities	Prescribes policies and procedures and assigns responsibilities for the operation and use of recreational land and water on U.S. Army facilities/activities.
AR 200-1	Environmental Protection and Enhancement	This regulation addresses environmental protection and enhancement and provides the framework for the Army Environmental Management System.
TM5-635	Outdoor Recreation and Cultural Values	
DODDIR 6050.2	Use of Off-Road Vehicles on DOD Lands	Off-road vehicles prohibited without environmental assessment
MOU – 7 April, 1978	MOU - Outdoor Recreation on Military installations	Memorandum of Understanding between DoI and DoD for the development of public outdoor recreation resources on military installations
DODINST 4700.2	The Secretary of Defense Natural Resources Conservation Award	
DODINST 4715.3	Environmental Conservation Program	Implements policy, assigns responsibilities, prescribes procedures for integrated management of natural and cultural resources
DODINST 7310.5	Accounting for Production and Sale of Forest Products	Provides for the accounting of forest products and the sales of those products.
DODDIR 4700.4 (also 32 CFR 190)	Natural Resources Management Program	Provides DoD policy on natural resources management.

4.4 FISH AND WILDLIFE MANAGEMENT

4.4.1 Introduction

4.4.1.1 Purpose

Under AR 200-1, Fort Gordon's NRB of the ED has prepared this fish and wildlife plan as part of the INRMP. The fundamental purpose of Fort Gordon's fish and wildlife program is to protect, conserve, enhance and utilize the fish and wildlife resources on the installation.

AR 200-1 sets forth goals that integrate natural resources stewardship and compliance responsibilities. This AR also states that INRMPs will develop, initiate, and maintain programs for the conservation, utilization, and rehabilitation of natural resources on U.S. Army lands to achieve sustainable ranges, and TAs, as well as other land assets. The regulation also sets forth the following objectives:

- Manage installation natural resources to provide the optimum environment, which sustains the military mission.
- Develop, initiate, and maintain progressive programs for land management and utilization.
- Maintain, protect, and improve environmental quality, aesthetic values and ecological relationships by:
    - Protecting Army real estate investment from depreciation;
    - Complying with environmental protection and enhancement policies and procedures as outlined in AR 200-1 and AR 200-2;
    - Protect and sustain natural resources from impacts of military missions through proactive conservation;
    - Implementing measures such as soil erosion control and prescribed fire;
    - Preventing damage and destruction of valuable natural resources from fire, insects, invasive species and disease;
    - Protecting plants and animals and the habitat they depend upon, especially endangered and/or threatened species by conducting surveys that map and shows the occurrence, habitat distribution and management areas; and
    - Responding to the increasing need for food, fiber, and timber products and outdoor recreational opportunities by managing lands capable of producing these resources as is consistent with the assigned military mission, and conservation of healthy ecosystems and biodiversity.
- Supporting military missions, especially training and field exercises, in a manner which will best accomplish the mission while protecting the environment.

- Protecting environmentally sensitive areas such as: floodplains, wetlands, steep slopes, aquifer recharge zones, barrier dunes, riparian zones and natural areas.

4.4.1.2 Management Plan

Fort Gordon's fish and wildlife management plan consists of nine main parts; Introduction, Management History, Management Goals and Actions, Fish and Wildlife Resources, Hunting and Fishing Program, Fishery Management, Wildlife Management Practices, Personnel Responsibilities, and Outside Assistance. The management actions contained in this plan are based on sound scientific research and history of past management success at Fort Gordon. Biodiversity and ecosystem management strategies are incorporated in this multiple land use management plan.

4.4.2 Management History

A detailed discussion of the history of natural resources management at Fort Gordon is provided in Section 2.1.3.3 of this INRMP.

4.4.3 Management Goals and Actions

The fish and wildlife program's primary goal is to maintain a variety of native flora and fauna at levels that supports biodiversity and will allow for a sustainable yield for recreational purposes, in conjunction with supporting the military training mission in a multiple land use strategy. Fort Gordon will be managed within adequate thresholds of ecological representation while providing an optimum mix of social and economic benefits (Haufler *et al*. 1996). Successful ecosystem management considers not only the ecological objectives but also incorporates social and economic objectives like natural resources based economies, recreation, aesthetics, and cultural and archeological values (Hafler *et al.* 1996). Management decisions will be based on sound scientific research and history of past management successes at Fort Gordon. Biodiversity/ecosystem management strategies will be incorporated in multiple land use management actions. To accomplish this, several methods of habitat and fish and game management will be utilized.

The goals listed below are broad statements that will benefit the whole ecosystem and can be applied to other ecosystems in other areas but are not specific enough to lead to an action (Table 4-4). Due to this, objectives and specific actions have been devised that takes into account the actual conditions and uses of the land at Fort Gordon (Table 4-5). Many actions below are listed more than once

because they help to accomplish numerous goals. Work plans to accomplish these management actions and goals are provided in Appendix S.

Table 4-4. Goals and Objectives of Fort Gordon's Fish and Wildlife Program

Goal 1:	Maintain Viable Populations of all Native Species In-Situ.
Objective 1.1:	Maintain and manage all populations of wildlife, game, nongame, threatened and endangered species on Fort Gordon.
Objective 1.2:	Maintain and manage fisheries in the waters of Fort Gordon to allow for recreational harvest of fish.
Objective 1.3:	Maintain and manage wildlife game species on the lands of Fort Gordon to allow for the recreational harvest of game.
Goal 2:	Represent, Within Protected Areas, All Native Ecosystem Types Across Their Natural Range of Variation.
Objective 2.1:	Integrate ecosystem management and multiple land use strategies in the actions taken on Fort Gordon, in accordance with DoD and U.S. Army policy.
Goal 3:	Maintain and Mimic Ecological Processes (*i.e.* disturbance regimes, hydrological processes, nutrient cycles, etc.).
Objective 3.1:	Maintain and enhance water quality and protect wetland habitats.
Objective 3.2:	Maintain and manage the land on Fort Gordon to provide a variety of habitat types to allow for greater species diversity.
Objective 3.3:	Accommodate human use and occupancy within the constraints of military training, hunting and fishing, other recreational uses, and forest product harvests.
Goal 4:	Manage the Lands of Fort Gordon IAW all Applicable Federal and State Laws and U.S. Army Regulations and Policies.
Objective 4.1:	Coordinate and consult with GADNR and USFWS on management of game species of fish and wildlife.
Objective 4.2:	Maintain and update the Fort Gordon hunting and fishing regulation.
Goal 5:	Monitor and Research Management Activities to Quantify Effectiveness of Actions and Incorporate Scientifically Proven Methods Used by Wildlife Managers.
Objective 5.1:	Monitor flora and fauna populations.
Objective 5.2:	Partnership with DPTMS and state universities.
Goal 6:	Provide Technical Assistance and Education Programs to Local Community on Fish and Wildlife Management and Activities Occurring on Fort Gordon.

Source: Fort Gordon 2008b

Table 4-5. Natural Resource Management Goals and Actions Related to Fish and Wildlife Management

Action	Goals
Prescribed fire	1, 2, 3
Ecosystem restoration	1,
Mid-story control1	1, 2
Establish native species	1
Protect water quality	1
Cover/fish attractors	1
Supplemental fish stocking	1
Supplemental fish feeding	1
Aquatic weed control	1
Fertilizing	1
Liming	1
Fish tissue analysis	1
Repair, restore, and maintain water control structures	1
Hardwood mast management	1
Strip disking	1
Wildlife clearings and plantings	1, 3
Edge maintenance/creation	1
Dove fields	1
Restore ecological processes	2
Fuel reduction	2
Growing season burns	2
Restore and establish native plants	2
Maintain water quality in accordance with the CWA	2, 3
Protect riparian areas	2, 3
Protect wetlands	2, 3
Restore native hardwood species	3
Stand conversion/clear-cutting	3
Vegetation mosaic	3
Control of hardwoods in upland pine stands	3
Herbicide	3
Roller chopping\flail mowing	3
Control of exotic, invasive and weedy species	3
Roads and firebreaks	3
Sikes Act	4
Section 7 consultation	4
RCW reintroduction	4
AR 200-1	4
Hunting and Fishing Advisory Council (HFAC)	4, 6
Game Warden Section, DES	4
NRB, DPWL	4
Staff Judge Advocate	4
DPTMS	4
DPS	5
Spotlight deer counts	5
Gobbler turkey counts	5

Table 4-5, continued

Action	Goals
Whistle quail counts	5
Creel surveys	5
Electro-shocking	5
Harvest records	5
Photo monitoring	5
Vegetation transects	5
ITAM	5
LCTA	5
Student Conservation Association	5
Nature trails	6
Wildlife display at local schools	6
On-post safety, poisonous plants and animal briefings to soldiers	6
Kids fishing derbies	6

Source: Fort Gordon 2008b

4.4.4 Fish and Wildlife Resources

4.4.4.1 Fisheries

Fort Gordon has a large number of game and nongame fish species. Bass, bream and catfish are the most popular game fish. A wide variety of darters, sunfish, and minnow species also occur on Fort Gordon.

There are 30 reservoirs located on Fort Gordon totaling 435.7 acres. Three lakes; Maxwell, Thomas, and Scout lakes had dams fail during a flood in 1990. Maxwell and Thomas lakes are to be repaired as moist soil management areas and at the present time there are no plans to restore Scout Lake. The remaining 27 Impoundment's on Fort Gordon are:

- Rainbow Lake (4.1 Acres)

This spring fed lake was once used as a "put and take fisheries" for rainbow trout. In 1962 through 1964, over 10,000 trout were released into the pond. The pond was used for hybrid sunfish experiments in the late 1970's until it was drained and restocked in 1979 and 1980. Currently the pond contains largemouth bass, bluegill, and redear sunfish and is open for fishing year round.

- Union Mill Pond (19.8 Acres)

Union Mill has received little management aside from vegetation control. In the interest of safety, fishing is not permitted during the migratory waterfowl season. A moist soil management plan was prepared and went into effect during the summer of 1997. Water levels were lowered several feet during summer months to allow

native vegetation to become established around the lake edges. The water level was raised during the winter months to increase the value for waterfowl species. Largemouth bass, bream, chain pickerel and suckers are the dominant fish species. There are 10 wood duck boxes that are being maintained at this lake.

- Lower Leitner Pond (25.3 Acres)

This lake contains bass, bream and sucker species. Like Union Mill Lake, this lake is part of the migratory waterfowl management program where the lake levels are lowered during the summer to increase native vegetation. The summer program in conjunction with supplemental plantings, are used to increase waterfowl use in the following winter. Fishing is not allowed during the waterfowl season. However, gill net fishing is allowed in this lake for sucker species after close of the Federal waterfowl season. Eighteen wood duck boxes are being maintained at this location.

- Leitner Lake (28.5 Acres)

A single lane bridge and an earthen dam were lost during the flood of 1992. The dam was repaired and the lake re-stocked with bass, bream and catfish in 1994. A recreation area is situated adjacent to this impoundment. Primitive camp sites, playground equipment and other related amenities are provided. The Fort Gordon Sportsmen's Club operates a lodge and restaurant at this location as well as an archery range. In 1997 this lake was designated catch and release for largemouth bass only. Other fish species may be kept in accordance with Fort Gordon and state regulations. There are five wood duck boxes being maintained at this lake.

- Rachel Lakes I, II, III, and IV (13.3, 7.4, 8.6, 3.2 acres, respectively)

This series of lakes is managed mainly for largemouth bass. These lakes are open to fishing year round and have a slot limit imposed on largemouth bass. The slot limit for largemouth bass is fish between 6 and 12 inches and fish greater than 14 inches are legal. Fish between 12 and 14 inches must be returned to the lake unharmed. Aquatic weeds have been a problem in these lakes and they will continue to receive herbicide treatments as needed. Some areas of these lakes are not accessible due to the amount of standing timber, making it hard to obtain complete control over the aquatic weed problem. There are 10 wood duck boxes being maintained at these locations.

- Upper Leitner Lake (24.3 Acres)

During the flood of 1990, this lake's dam started to overtop from excessive rainfall and water from several failed ponds off the installation. The dam eventually failed, completely draining the

lake. The dam was repaired and the lake was restocked in 1992. This lake is being managed for largemouth bass and bream production; however, surveys show that there are increasing populations of crappie and sucker species.

- Claypit I (12.4 Acres)

In the past this lake was managed with a cooperative agreement with the University of Georgia and Fort Gordon to study catfish production. These studies went on for several years during the 1970s. This required that this lake receive supplemental feeding to allow for maximum stocking rates of catfish. This type of management continued until 1995 when it was decided to manage all the lakes at Fort Gordon as multi-species lakes consisting of bass, bream and catfish. At this time, the supplemental stocking and feeding program was discontinued. Supplemental stocking was reintroduced with 1500, 6 to 8 inch channel catfish stocked in December of 1999 to increase fishing success.

- Claypit II (4.0 Acres)

This lake was stocked and fished exclusively for catfish. A deteriorating drainage structure caused the lake to drain in 1990. Attempts to repair the structure have only proved temporary as the lake is now only at half capacity. The lake was restocked with bass, channel catfish and bream and is open to fishing. A work order has been submitted and the water control structure could be repaired if funds become available.

- Claypit III (3.0 Acres)

This lake was part of an aquaculture experiment to determine the growth aspects of catfish. The experiment was conducted as a joint effort between the University of Georgia Cooperative Fisheries Unit and Fort Gordon. The lake had been closed to fishing since the end of these experiments. In 1998 this lake was selected as the site for the installation's kids fishing rodeos. This lake is stocked twice a year prior to fishing rodeos with approximately 1000, 9-inch channel catfish. The Georgia Department of Natural Resources supplies these fish to Fort Gordon. This lake is the only lake that received supplemental stockings/feeding between 1993 through 1999.

- Howard Lake (8.7 Acres)

Howard Lake was managed as a catfish impoundment until 1990. At this time management converted it to a sport fishing lake containing bass, bream, catfish and crappie. This lake is scheduled to receive yearly supplemental stockings of catfish as funds or fish become available. A small dock and automatic feeder will be installed in the future so supplemental feeding can be accomplished with minimal labor. Currently this lake does not

receive supplemental feeding. Howard Lake was stocked with 1560, 6 to 8-inch channel catfish in December of 1999.

- Little Smoak Lake (12.2 Acres)

This lake is another bass and bream lake. It was renovated and stocked in 1974. In 1997 beavers became a problem in the upper end where Little Smoak Creek crosses the installation boundary. Trapping will be used to control this problem as beavers build dams that back water off the installation causing possible timber lost to private landowners. This lake has had a history of a serious aquatic weed problem. Herbicides have been used to control this problem as stocking of grass carp has had little effect.

- Big Smoak Lake (14.2 Acres)

Big Smoak is also stocked with bass and bream. It is open for fishing year round. Aquatic weeds will be monitored and problems accessed and treated as needed.

- Fettig Lake (8.3 Acres)

This lake is another former catfish management impoundment that was converted to a bass and bream lake in 1995. It will receive supplemental stocking of 6 to 9-inch catfish each year as funds or fish become available. A small dock has been built and an automatic feeder installed to allow supplemental feeding with minimal labor cost. Cage culture has also been used in this lake to grow out catfish fingerlings for additional stockings. This lake received 500, 8 to 9-inch channel catfish in August of 1999.

- Little Beaver Pond (5.3 Acres)

Little Beaver was maintained as a stocked catfish only lake until 1995. Then it was converted to a bass, bream and catfish lake. This lake will also receive supplemental stockings of 6 to 9-inch catfish as funds or fish become available. A dock has been repaired and an automatic feeder has been installed to allow for supplemental feeding to be accomplished with minimal labor cost. Cage culture will also be done in this impoundment. This lake received 1,200 6 to 8-inch channel catfish in August of 1999.

- Big Beaver Pond (20.7 Acres)

This former catfish impoundment was drained in 1987 and was reopened for fishing in 1989. It was converted to a bass, bream and catfish lake in 1995. A small dock was built to support an automatic feeder that will allow for supplemental feeding. Plans are to stock additional catfish, which will allow for increased harvest. This lake received a supplemental stocking of 2000, 6 to 8-inch channel catfish in December of 1999.

- Whittimore Pond (8.1 Acres)

A former catfish impoundment, this pond was drained in 1996 and restocked with bass, bream and catfish. The lake was closed to fishing to allow growth of the restocked fish until January of 1999. This lake has historically had an aquatic weed problem and is treated with herbicides as needed.

- Upper Whittimore Pond (4.0 Acres)

The first of a series of impoundments, Upper Whittimore has historically never maintained a full pool due to a problem within the dam structure. A pumping station built at the upper end of Whittimore Lake to pump water back into Upper Whittimore has not been operational since the early 1970's. Since then the lake has maintained a level of approximately one-third of the full pool. It was a managed catfish only lake until 1995 when it was converted to a multi-species impoundment.

- Thomas Lake (19.3 Acres)

The lake is located in the SAIA (Block D). The dam for this lake was lost in a flood in 1990. The NRCS designed a water control structure that will allow this lake to be managed as a moist soil management area. At the present time funds are not available to restore this lake. The southside of the dam is still washed out from the flood of 1990 and the lake remains only about 5 acres in size.

- Maxwell Lake (10.3 Acres)

This lake is close to the cantonment area and received heavy fishing pressure in the past. The dam of this lake was also lost in the flood of 1990. This lake will also be repaired as a moist soil management area for waterfowl. This design was completed by the NRCS in 1999. This lake will be repaired, as funds become available.

- Gordon Lake (37.3 Acres)

Gordon Lake is located about 1.2 miles downstream from the wastewater treatment plant on Spirit Creek. This lake also provides the water hazard as well as the primary water source for irrigation at Gordon Lake Golf Course. Sport fishing is permitted in designated areas near the dam. Several fish kills have occurred within this impoundment in the past from possible herbicide contamination. Efforts will be made to monitor water quality and act as needed.

- Mirror Lake (12.4 Acres)

This lake was drained and partially dredged around the bank in 1989. However, the dredging was not completed at the upper end

where most of the erosion occurred. It was then restocked and opened for fishing in 1992. This lake was then chosen as the site for Kid's Fishing Rodeos for the next few years until 1995. Again this lake was drained and restocked in 1996 and was open to fishing in 1998. Sediment from up-stream erosion has caused a serious siltation problem in the upper end of this lake causing aquatic weed control to be impossible without some form of dredging. Herbicide applications have done little to control this problem, therefore new management decisions will have to be explored as this is a highly visible and popular facility. The lake is located adjacent to a recreation facility and playground used for family activities. This is a family fishing lake and only children 15 or younger may fish here. Parents/adults accompanying children may also fish.

- Scout Lake (5.6 Acres)

The dam of this lake failed and forced the draining of the lake. At the present time there are no plans to repair the lake.

- Wilkerson Lake (3.9 Acres)

The lake is open all year to fishing. Its close proximity to the cantonment area results in very heavy fishing pressure. Picnic and playground areas are located next to this lake. Aquatic weeds will be monitored and treated as needed. This dam was also lost in the flood of 1990 and was repaired and restocked in1993. It has been open for fishing since 1994.

- Soil Erosion Lake (12.0 Acres)

This lake was created to reduce the effects of erosion. The lake was open to fishing year round; however, samples taken from the bed sediment in 1999 showed evidence of mercury and lead, which prompted the closing of this lake to fishing. Fish tissue samples were taken and showed extremely high levels of heavy metals. Due to this, fishing will not be allowed in this lake in the foreseeable future. This lake also received some damage during the flood of 1990 and repairs were made and a large concrete spillway was constructed in the middle of the dam.

- Experimental Lake (1.4 Acres)

Due to close proximity of this lake to the quarters of the Commanding General and other senior officers of Fort Gordon, access is restricted for security reasons. There is no open season for fishing on this lake. This lake was chosen as a site to receive a refugial population of robust redhorse suckers (state listed endangered fish) in November of 1999. Since then this lake has received two additional shipments of suckers. It was treated to

remove all fish from the lake prior to the arrival of the suckers by shocking and transplanting all fish that could be moved and then treated with rotenone (5 percent) to remove any additional fish. These fish will be used as a possible breeding stock in the future or as supplemental stocking along the Savannah River. These efforts will be done in conjunction with the Robust Redhorse Conservation Committee (RRCC).

- Butler Reservoir (81.9 Acres)

This reservoir provides the water supply to Fort Gordon. Efforts are made to reduce or eliminate any contamination or pollution from entering the lake. Butler Reservoir is the location used for fishing tournaments hosted by the Fort Gordon Sportsmen's Club (FGSC). Only supervised tournaments are allowed in the lake. A fence along the northern portion of the lake serves as the installation boundary and does little to prevent unauthorized access to the lake. The dam received some damage during the flood of 1990 and repairs were made and a large concrete spillway was constructed in the middle of the dam.

- Boardman Lake (6.9 Acres)

Located within the Boardman Lake Housing area this lake is restricted to residents and their guests. Fishing is allowed for these individuals. This lake was also damaged during the flood of 1990. Repairs were made and the lake was restocked and again opened for fishing in 1993. It is stocked with bass, bream and catfish.

4.4.4.2 Streams and Creeks

In addition to the lakes and ponds there are also approximately 74 square miles of drainage supplied by several streams and creeks on Fort Gordon. These creeks offer excellent fishing opportunities for red breast, bass and other species. Streams and creeks on Fort Gordon are discussed in detail in Section 2.3.2.5 of this INRMP.

4.4.4.3 Potential for Fisheries

Recreational fisheries on Fort Gordon have greatly declined. This is mostly due to the lack of personnel to properly manage so many fishing resources. With additional personnel, supplemental feeding, and a more comprehensive fertilizing and liming program, fisheries production could be greatly increased. In 1965, there were 25,064 bluegill, 2,597 bass, and 18,233 catfish caught on the installation. The harvest rates for 2006 were 5,354 bream, 1,883 bass, and 2,940 catfish.

4.4.4.4 Biological Resources

Fort Gordon consists of approximately 55,600 acres of land that is broken down into 49 different TAs, the SAIA, AIA, and cantonment area. Approximately 43,516 acres are managed for hunting and the remaining 11,777 acres are considered designated no hunting areas. The no hunting areas consist of the AIA, dud areas, and developed portions of the cantonment area. Some portions of this plan will be used to manage the biological resources found on Fort Gordon.

4.4.4.5 Animals

Fort Gordon is inhabited by a wide variety of wildlife species. Wildlife species found on Fort Gordon are discussed in detail in Section 2.3.3 of this INRMP and a list of those species is provided in Appendix F. Many of these species are actively managed for sport hunting and fishing. A list of wildlife and fish game species is provided in Table 4-6.

Table 4-6. Wildlife and Fish Game Species Found on Fort Gordon

Common Name	Scientific Name
Birds	
Wood duck	*Aix sponsa*
Eastern wild turkey	*Meleagris gallopavo*
Bobwhite quail	*Colinus virginianus*
Mourning dove	*Zenaida macroura*
Mammals	
Eastern gray squirrel	*Sciurus carolinesis*
Eastern fox squirrel	*Sciurus niger*
Eastern cottontail rabbit	*Sylvilagus floridanus*
White-tailed deer	*Odocoileus virginianus*
Raccoon	*Procyon lotor*
Fish	
Largemouth bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Redear sunfish	*Lepomis microlophus*
Channel catfish	*Ictalurus punctatus*
Redbreast Sunfish	*Lepomis auritus*

Fort Gordon 2001

Hunting

Hunting and fishing are allowed on the installation under the Sikes Act and are regulated by AR 200-1, USASC&FG Regulation 420-5, and Fort Gordon NRB personnel and GADNR. The most sought after game species on Fort Gordon are white-tailed deer, Eastern wild turkey, and Northern bobwhite quail. Those individuals

authorized to hunt on Fort Gordon is established in USASC&FG Regulation 420-5 and is discussed in detail in Section 4.4.5.1.

Predators

Several species of predators are common to Fort Gordon. A list of common predators, both game and nongame species, on Fort Gordon is provided in Table 4-7.

Table 4-7. Common Predator Species on Fort Gordon

Common Name	Scientific Name	Population Problem
Game Species		
Bobcat	*Lynx rufus*	None
Gray fox	*Urocyon cinereoagenteus*	None
Red fox	*Vulpes fulva*	None
Coyote	*Canis latrans*	Possible deer predation
Nongame Species		
Barred owl	*Strix varia*	Possible RCW predation
Great horned owl	*Bubo virginianus*	Possible RCW predation
Screech owl	*Otus asio*	None
Red-tailed hawk	*Buteo jamaicensis*	None
Red-shouldered hawk	*Buteo lineatus*	None
Cooper's hawk	*Accipiter cooperii*	Possible RCW predation
Sharp-shinned hawk	*Accipiter striatus*	None
Sparrow hawk	*Falco sparverius*	None
Snake species		Nest predation

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At this time, as well as, in the foreseeable future, Fort Gordon does not see a need for any control of the above listed nongame species. Overall, there are no major problems beyond the natural checks and balances these species provide for other wildlife species.

Nongame Species

State law prohibits the taking of nongame wildlife, except for rats, mice, armadillos (*Dasypus novemcinctus*), beaver (*Castor canadensis*), and coyotes. Coyotes may only be taken on Fort Gordon during any hunting season. Enforcement of these protective measures, as well as, prescribed burning, forest management, and management of wildlife openings are several tools used for management of nongame species on Fort Gordon. Other actions that benefit nongame species include: artificial nest structures and plantings designed to benefit both game and nongame wildlife. Fort Gordon maintains kestrel, bat, and bluebird (*Sialia* spp.) boxes and has participated in the Georgia breeding bird atlas and tanager projects. See Figure 4-5 for the location of

kestrel nest boxes on Fort Gordon. Emphasis placed on management of nongame species (other than threatened and endangered species) will reflect public demand and availability of funding and personnel.

4.4.4.6 Plants

Fort Gordon's geographical setting provides for diversity of plant communities and species. Vegetation on the installation is discussed in detail in sections 2.3.4 and 4.5.4 of this INRMP.

4.4.4.7 Education and Safety

The NRB participates in several educational and safety events throughout the year. Events conducted or attended by NRB personnel were discussed in Section 3.5.2 of this INRMP.

4.4.5 Hunting and Fishing Program

Fort Gordon's hunting and fishing program, including the public access and lottery draw were discussed in detail in Section 3.5.1 of this INRMP.

4.4.5.1 Regulations and Laws Applicable to Fort Gordon Access for Hunting and Fishing

USASC&FG Regulation 420-5 establishes who is authorized to hunt and fish on Fort Gordon. The privileges to hunt and fish are extended to active and retired DoD personnel and their family members as defined in the The Joint Federal Travel Regulation (Volume I), Appendix A, and their bona fide guests. Hunting and fishing priveleges are also extended to DoD civilian employees and DoD civilian contractors at Fort Gordon with four or more 1-year options.

Members of the U.S. Army/Air National Guard, drilling reservists, and 250 individuals from the public access lottery are extended hunting and fishing privileges on Fort Gordon. Due to the size of the installation and military mission, Fort Gordon has limited access to these individuals in order to insure compatibility with public safety and mission activities, as well as availability of resources.

Other activities of the Fish and Wildlife plan are also covered under several DoD, state, and Federal laws and regulations that were discussed in Section 4.3 of this INRMP.

4.4.5.2 Licenses Sales

As set forth in AR 200-1 user fees may be collected to recover expenses of managing natural resources for outdoor recreation. On Fort Gordon these fees are collected in the form of hunting and fishing licenses. All fees collected will be accounted for in accordance with guidance provided for the appropriation titled *Wildlife Conservation Military Installations*, Army account 21X5095 (AR 37-100 and 37-108). These funds (21X monies) may be used only for fish and wildlife management on the installation where they were collected. Funds required to administer the collection of these funds will not exceed 10 percent of the annual revenues from hunting and fishing permit sales. Licenses, both state and Fort Gordon, are sold by DFMWR at the Tactical Advantage Sportsman's Complex on Carter Road. Qualified personnel must posses both state and Fort Gordon licenses to legally hunt on the installation.

4.4.5.3 Funding

U.S. Army guidelines require Fort Gordon's Forestry and Fish and Wildlife sections to implement management actions for reasons other than game management, so the bulk of game management's actions may be accomplished with little added 21X expenditures. The most effective management actions available to the Fort Gordon NRB are prescribed fire, strip disking and thinning the forest. Fort Gordon's Forestry and Fish and Wildlife sections are required to conduct prescribed fires for endangered species management and for wildfire control purposes. Prescribed fires will be conducted in accordance with Fort Gordon's IWFMP (Section 4.15). Forests need to be thinned to improve endangered species habitat and to improve conditions for military training.

The budget for actions pertaining only for hunting and fishing is largely supported by user fees (21X monies) generated from the sale of Fort Gordon hunting and fishing permits. The costs of these permits are set in conjunction with the Fort Gordon Hunting and Fishing Advisory Council (HFAC) so that all individuals who wish to participate can afford to. Funding for hunting and fishing and permit costs are discussed in Section 5.4.3.

The average number of licenses sold per year over the last 6 years (FYs 2001 through 2006) has been 2,614. The sale of these licenses has generated approximately $43,000 for the management of the hunting and fishing program on Fort Gordon annually.

4.4.5.4 Fort Gordon Hunting and Fishing Advisory Council

The HFAC was formed in 1962 to give the sportsman population a voice in the management of Fort Gordon's fish and wildlife resources. The council meets twice a year to raise and discuss issues of concern related to the fish and wildlife program.

4.4.5.5 Fort Gordon Sportsman Club

Kids fishing rodeo on Fort Gordon

The Fort Gordon Sportsman Club (FGSC), under the Sports and Leisure Branch of DFMWR, works in conjunction with the Fish and Wildlife Section to sponsor and manage several outdoor related events throughout the year. The club conducts fishing tournaments on Butler Reservoir. They also are sponsors of the kids fishing rodeos along with Fort Gordon's Fish and Wildlife Section and GADNR. Additionally, FGSC operates a shooting range for the zeroing in of hunting weapons as well as recreational shooting. The club also operates a shooting preserve in portions of TAs 23, 28 and 30 (Figure 4-7). FGSC maintains a permit for the release of quail, ring necked pheasant (*Phasianus colchicus*) and chukar (*Alectoris chukar*). A copy of the current shooting preserve permit, renewed annually, is kept on file at the fish and wildlife office. The Sportsman Club may charge a user fee for these types of optional hunting and fishing services that do not contribute to the 21X account; however, individuals participating in these activities must possesses a Fort Gordon hunting and/or fishing licenses.

4.4.5.6 Trophy Management

The SAIA has been under trophy management since 1998. Trophy management is discussed in detail in Section 4.4.7.7.

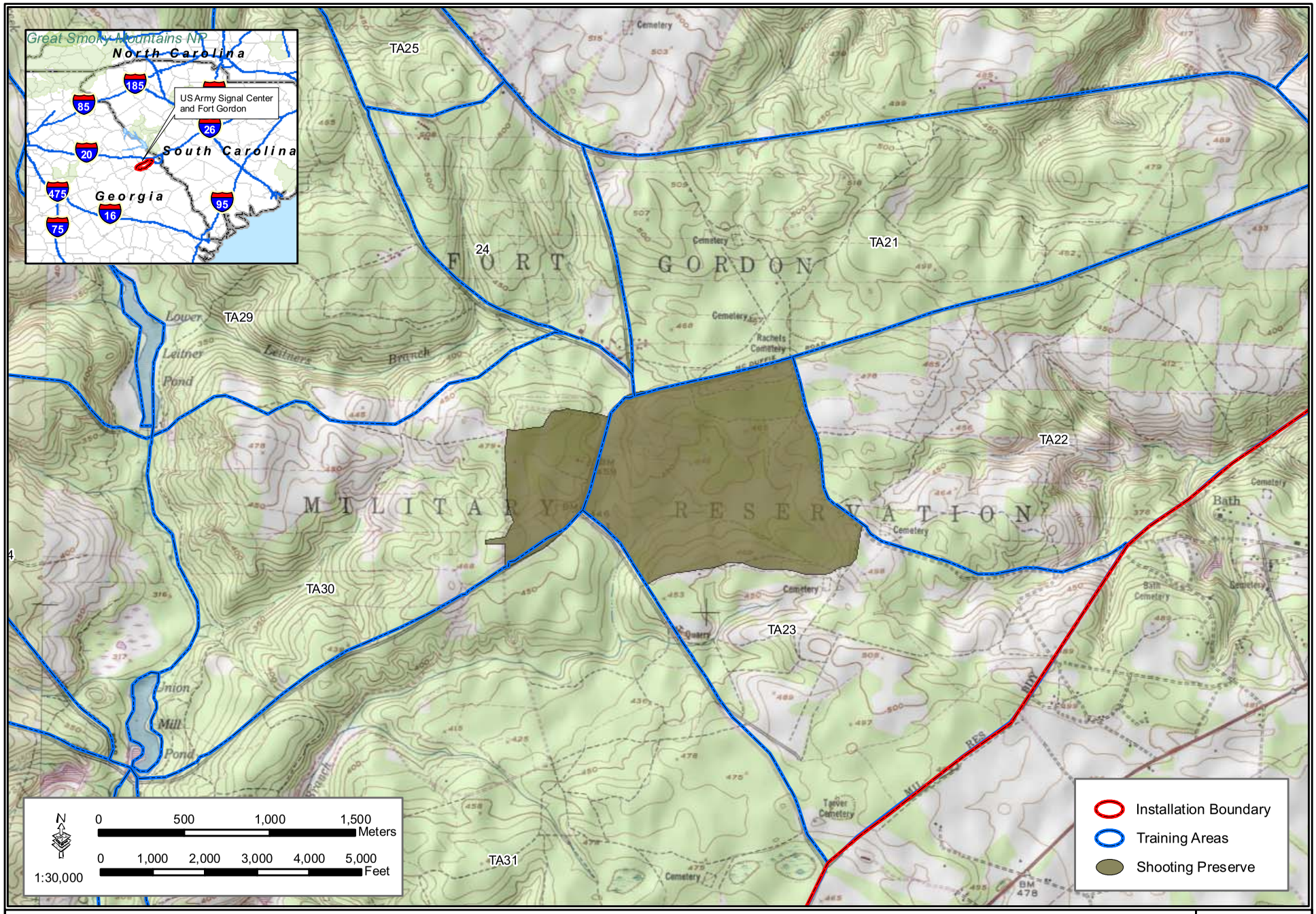


Figure 4-7: Shooting Preserve

GSRC

February 2008

4.4.5.7 Historic Harvests

Historically, the annual deer harvest on Fort Gordon has averaged approximately 300 deer. The wild turkey harvest averages approximately 44 turkeys per year on the installation. Harvest records for deer and turkey for the past ten years are shown in Table 4-8.

4.4.5.8 Personnel Requirements

Fish and wildlife management on Fort Gordon requires a number of personnel and organizations to accomplish the tasks outlined in this plan. The lack of adequate personnel hampers the management of fish and wildlife resources on Fort Gordon. The staff requirements to support the Fort Gordon's fish and wildlife program are discussed in detail in Section 5.5 of this INRMP.

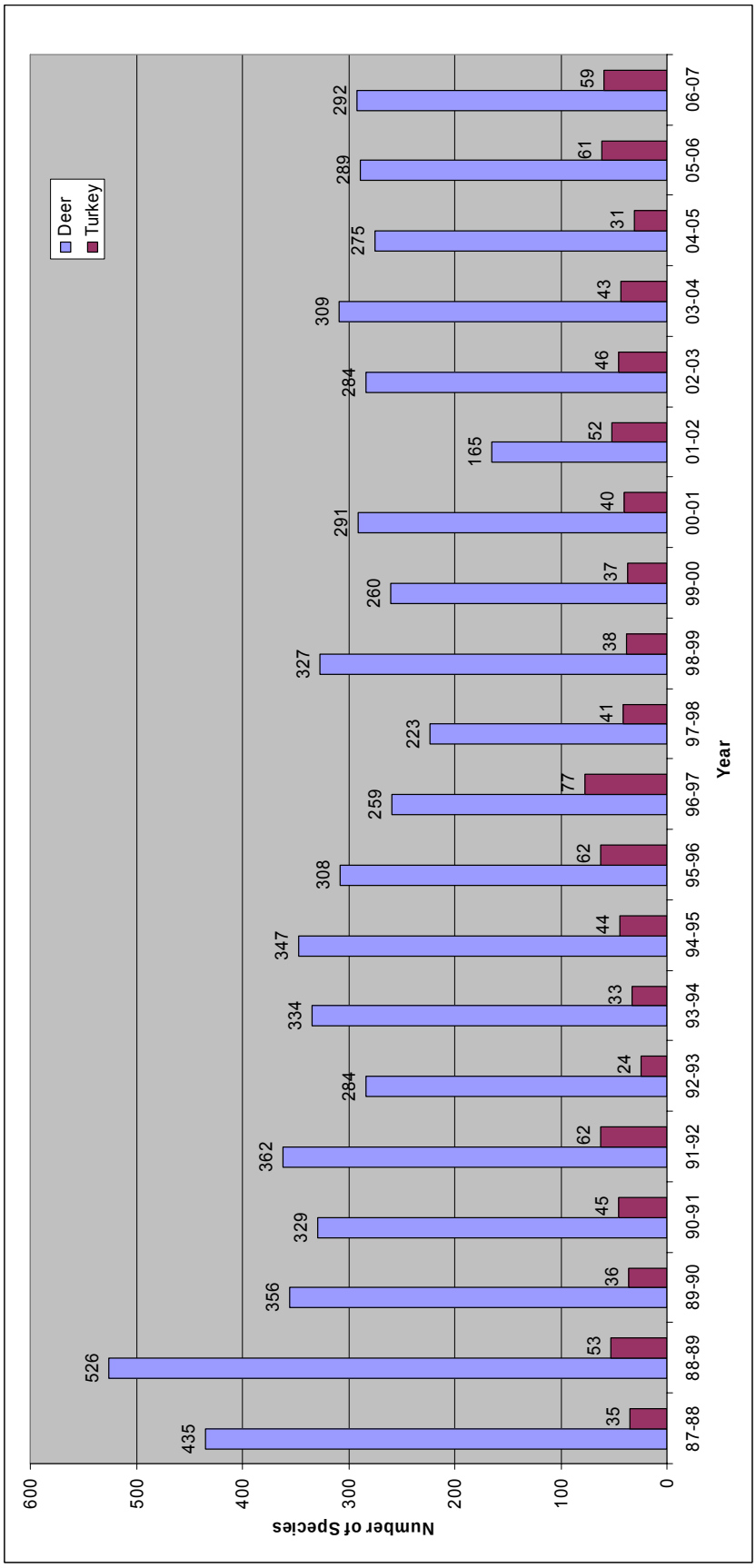
4.4.6 Fisheries Management

4.4.6.1 Water Quality

Water quality on all lakes and streams will be periodically monitored to determine if management actions are required. Water will be monitored for pH, color, point and nonpoint source pollution, total hardness and turbidity. Additionally, heavy metals or other toxic materials that bio-accumulate in fish tissues will be monitored. Several established sampling points are located on the installation's streams and creeks.

Erosion and sediment will be controlled in areas where it is impacting water quality. Riparian areas and vegetative buffer strips will be maintained, where possible, to help reduce the effects of erosion and sediment and pollution. Some riparian areas will be planted with native species purchased with money received from grants for the protection of watersheds.

Table 4-8. Turkey and Deer Harvest by Year



4.4.6.2 Lime and Fertilizer

Lime and fertilizer will be applied to manage lakes to maintain the productivity of those waterbodies. A brief description of methods to be used follows:

- Lime - Several lakes on Fort Gordon have soft water (low total hardness) and fail to achieve a satisfactory plankton bloom unless some form of lime is added. When a lake's total hardness drops below 10 parts per million (ppm), agricultural (dolomitic) lime must be added in order to achieve a satisfactory bloom (Gilbert and Lewis 1998). In lakes that have a total hardness greater than 15 ppm, liming will have little effect on fish production. Most ponds require application of at least one ton of lime per acre every 3 to 4 years. Lime will be applied as money and resources become available. Lime will increase the amount of phytoplankton, which is the base of the food chain in many pond systems, stabilize the pH of bottom mud and increase the availability of phosphorus. The increase of food availability will support more fish production in the lake. (Gilbert and Lewis 1998). Lakes will be monitored for a lime deficiency every 2 to 3 years by checking the total hardness.
- Fertilizer - Fertilization increases the capacity of a pond to produce fish (carrying capacity). In a bass-bream-catfish lake, carrying capacity increases from about 100 pounds per surface acre in natural lakes to 300 pounds or more per surface acre in fertilized ponds. Fertilizing a pond increases phytoplankton. This gives the pond a dark green color or bloom. Therefore, as more food becomes available through the food chain, smaller fish populations such as bluegill increase and supply more forage for larger predators species such as largemouth bass.

Fertilization will begin in February or early March when water temperature stabilizes above 60°F. The initial application rate, or until a bloom has developed, of 80 pounds (dry) of 20-20-5 fertilizer (or the equivalent) per surface acre or two gallons of liquid (10-34-0) fertilizer per surface acre will be applied. When proper color develops, a bright object can not be seen more than 18 inches below the surface of the water; treatments will then be reduced to half the initial application rate. If proper color does not develop after the third application, the water will be tested to determine if lime is needed. Treatments will occur throughout the summer to maintain the proper water color. This consists of approximately eight to 12 applications per year. Fertilization will stop when water temperature

stabilizes below 65°F which is generally in October or November (Gilbert and Lewis 1998).

4.4.6.3 Aquatic Weed Control

Dense stands of aquatic vegetation, especially submersed and emergent plants, may bind up nutrients and eventually reduce the amount of food available for fish. Excessive small bream may indicate a stunted population. If aquatic weeds are excessive, control measures will be used.

Weeds will be treated using the integrated pest management system. This system implements the most effective, inexpensive and most current scientific methods available. Aquatic weeds are recognized as a natural and necessary part of a lake ecosystem and will only be treated when their growth becomes excessive. Several methods under the integrated pest management philosophy will be used to help control the aquatic vegetation in the ponds. A brief description of methods to be used follows:

- Winter Draw Down - In the fall of the year, the lake levels will be reduced to allow winter frost to kill the weeds that occur at the edges of the impoundments. This will also help in driving small baitfish out into open water and increase the food source for game fish over the winter months. Levels will be restored in the spring of the year as fishing pressure begins to increase in the ponds and as spawning seasons begin. Union Mill and Lower Leitner lakes will not follow this schedule, as they are waterfowl management lakes, which will follow the moist soil management program.
- Herbicide - Herbicide application should be used as early in the spring as possible to bring aquatic vegetation under control before a complete infestation has occurred. Diquat, Reward, 2-4-D, Sonar or other herbicides will be applied as needed to control weeds during the spring and summer months. Manufacturer directions will be followed and the chemical application will comply with all DoD and EPA requirements. Usually only a small portion of the lake will be treated at any one time to protect against lowering oxygen levels and causing fish kills. Treated lakes will be closed to fishing during the application and for the required time in accordance with the herbicide label.
- Biological control (grass carp) – Triploid Grass carp (*Ctenopharyngodon idella*) will be added to some ponds on a limited basis to feed on and reduce aquatic vegetation. This fish is known to aggressively feed eating two to three times

their body weight per day on aquatic plants and will help reduce the need for other methods. This method should reduce the need for herbicides and provide control for as long as 10 to 15 years. Triploid fish are stocked preventing the natural reproduction of the species. Fish are usually purchased from a local certified supplier who can provide proof of purchase and certificate of triploidy.

4.4.6.4 Cover\Fish Attractors

Fish attractors in ponds can benefit all species of fish. Benefits include the aggregation of baitfish, additional substrate for aquatic invertebrate production, increased spawning habitat, and shelter. Many of the ponds on Fort Gordon lack structure that would be used as cover by fish species. Several types of fish attractors may be used at Fort Gordon including sunken Christmas trees, PVC structures, and pallets. Attractors will be marked with buoys anchored near the attractor site to allow anglers to locate and fish on the sites. Fish attractor site selection is based on the amount of naturally occurring structure, water depth, pond size and angler use (Lewis unknown).

4.4.6.5 Population Census

Fish population sampling has traditionally emphasized ponds and lakes under management. Sampling is conducted from April to September to evaluate the presence and relative abundance of largemouth bass and bream reproduction; the presence and relative abundance of intermediate-sized bream and bass; the condition of all species; and the presence and relative abundance of competitive nongame species.

Several methods will be used to estimate the number, species composition, and age class of fish in Fort Gordon lakes and ponds. This is required to make decisions on management of the fisheries resources. Some or all of the following methods will be used:

<u>Creel Survey</u>

Creel surveys are an integral component of managing recreational fishing. Creel surveys can assess:

- Quality of sport fishing, expressed as species caught and number and weight of fish caught per unit of fishing effort;
- Fishing pressure, expressed as angler-hours of fishing effort for all species or separate species;

- Total yield of fish in terms of species numbers and weights for specific segments of time;
- Composition of the catch, as a percentage of total numbers, and weights for various species and classes of fish;
- Characteristics of the fishery, such as socioeconomic information about the angling population and value of the fishery to surrounding communities;
- Statistics about the fishing population, such as annual exploitation rate of various year classes of selected species, appraisal of new year classes recruited into the fishery, and population estimates and mortality rates for selected species; and
- Other miscellaneous data decided upon prior to design and implementation of surveys.

Creel surveys must be repeated periodically to observe trends and record changes that may impact the fishery. Changes in fisheries management may be required to keep abreast of changes in fishing pressure, catch rates, etc. as determined from survey results. Creel surveys can also measure effects of management techniques, such as drawdown, fish population control actions or fishing regulations. Finally, creel surveys furnish information of interest to anglers that may aid them in their own fishing efforts.

The creel survey must be statistically valid and cost effective. Survey design should be based on random sampling. The survey should incorporate a stratified sampling scheme to increase the homogeneity of each sampling unit. Because of time, cost, and logistical constraints, it may be necessary to divide the fishery into smaller units with different sampling probabilities. Such a design can minimize cost and labor and increase survey precision. Survey types include roving creel or access point surveys, telephone surveys, questionnaires, or combinations thereof.

Electro Shock Survey

Electro sampling is conducted from March thru November using 500 to 1,000 volt, pulsed DC current adjusted for conductivity and other water conditions. Data obtained includes species composition, length frequencies and reproduction verification. This data aids in management decisions made for fishery resources.

Basket Survey

Baskets or traps will be used to catch species not usually caught in other survey methods. This helps to alert the biologist to the presence of unwanted species such as yellow bullhead catfish.

Gill Net Survey

Historically, gill net fishing for sucker species has been allowed in certain lakes with written permission from the DPWL, ED. This type of sucker fishing has been very popular with local fishermen and is a beneficial way to remove nongame species. When used, fishermen will be surveyed to gather data on species composition of the catch. Past surveys have shown over 95 percent of the catch as nongame species.

Slot/Creel Limits

Based on survey information, size limits for particular species may be set on certain lakes and ponds to keep the balance of predator and prey species in the lake. Lakes may also be designated as catch and release only for certain species. Creel and slot limits are subject to change at any time in lake management. Current creel and slot limits can be found in USASC&FG Regulation 420-5 (Appendix I).

4.4.6.6 Sportfish Management

Fort Gordon has 28 lakes managed for fisheries. At the present time three lakes (Thomas, Maxwell, and Scout Lakes) have failed dams and are waiting funding for repair. However, Thomas lake is still managed for fisheries. Most lakes are managed for bass, bream and catfish species. A listing of managed lakes can be seen in Table 4-9. Due to lack of personnel to perform lake management in the past, the fishing program has declined. In order to rebound fish populations and angler success the following general measures will be taken:

- Creel limits post wide are currently 10 bass, 5 catfish (channel, blue or white species) and 30 bream. Creel limits are listed in USASC&FG Regulation 420-5 (Appendix I).
- Supplemental stocking of catfish has been conducted in several lakes to increase angler success for these species. At the present time eight lakes have received supplemental catfish stocking. This program will be expanded as fish and funds become available.
- Herbicide treatment for weed control will continue in lakes.

- The amount of fertilizer applied to lakes will be increased to allow for more algae bloom and a larger food source for fish populations. A secchi disk will be used to determine when enough fertilizer has been applied and proper water color has developed.
- Structure will be added to lakes that have little or no natural features. This will include natural structure such as Christmas trees and man made objects such as freshwater fish attractors.

Table 4-9. Lakes Managed for Fishing at Fort Gordon

Lake	Acres	Species	Boats	Ramp	Supplemental Catfish	Feeders	Comments
Rainbow	8.10	B,Bm,C	Y	N	N	N	
Union Mill	19.8	B,Bm,C	Y	Y	N	N	
Lower Leitner	25.3	B,Bm,C	Y	Y	N	N	
Leitner	28.5	B,Bm,C	Y	Y	Y	N	
Upper Leitner	24.3	B,Bm,C	Y	Y	N	N	
Rachel I	13.3	B,Bm,C	Y	N	N	N	Slot limits
Rachel II	7.4	B,Bm,C	Y	N	N	N	Slot limits
Rachel III	8.6	B,Bm,C	Y	N	N	N	Slot limits
Rachel IV	3.2	B,Bm,C	Y	Y	N	N	Slot limits
Clay Pit I	12.4	B,Bm,C	Y	N	Y	Y	Kid's Fishing Derby
Clay Pit II	4.0	B,Bm,C	N	N	Y	Y	Kid's Fishing Derby
Clay pit III	3.0	B.BM,C	N	N	Y	Y	Kid's Fishing Derby
Howard	8.7	B,Bm,C	Y	Y	Y	Y	
Little Smoak	12.2	B,Bm,C	Y	Y	N	N	
Big Smoak	14.2	B,Bm,C	Y	Y	Y	N	
Fettig	8.3	B,Bm,C	N	N	Y	Y	
Little Beaver	5.3	B,Bm,C	N	N	Y	Y	
Big Beaver	20.7	B,Bm,C	Y	Y	Y	Y	
Whittimore	8.1	B,Bm,C	Y	Y	Y	N	
Upper Whittimore	4.0	B,Bm,C	N	N	N	N	
Thomas	19.3	N/A	N/A	N/A	N/A	N/A	Damn failed, moist soil mgt area
Maxwell	10.3	N/A	N/A	N/A	N/A	N/A	Dam failed, lake dry
Gordon	37.3	B,Bm,C	N	Y	N	N	
Mirror	12.4	B,Bm,C	N	N	N	N	golf course water hazard
Scout	5.6	N/A	N/A	N/A	N/A	N/A	Dam failed, lake dry
Wilkerson	3.9	B,Bm,C	Y	N	Y	N	Restocked 2007

Table 4-9, continued

Lake	Acres	Species	Boats	Ramp	Supplemental Catfish	Feeders	Comments
Soil Erosion	12.0	B,Bm,C	Y	N	N	N	temporarily closed
Experimental	1.4	RRH	N	N	N	N	stocked with RRH
Butler	81.9	B,Bm,C	Y	Y	N	N	Restricted use
Boardman	6.9	B,Bm,C	Y	N	N	N	Restricted use

Source: Fort Gordon 2008
B = Bass, Bm = Bream, C = Catfish, RRH = Robust Redhorse.
N/A = not applicable

4.4.6.7 Drain and Restock

Supplemental fish stocking

When data from surveys indicate that the fish population of a lake is extremely out of balance or when the number of game species becomes too low, the lake may be drained and restocked. The specifications listed in Table 4-10 will be used as a guide in the determination of draining ponds (Lewis 1981). The cost of draining and restocking will have to be considered due to the condition of stand pipe structures. Most of the stand pipe structures are in disrepair and will need to be fixed in order for the lake to fill. As funding becomes available, lakes can be drained and restocked as required.

Table 4-10. Indicators for Determining Pond Draining and Restocking Requirements

Catch	Population Condition	Action
Bluegill 6 inches and larger Bass- All sizes caught (Average 1 to 2 pounds)	Desirable Balanced	No Action
Bluegill 3 inches to 5 inches Bass very few 2 pounds and larger	Over crowded Bluegill	Drain and restock
Bluegill exceed 0.3 pounds average Bass less than 1 pound	Bass Heavy	Drain and restock
Small Crappie, Sunfish, Bullheads Carp, Suckers, Golden Shiner	Species competing with Bluegill	Drain and restock

Source: Lewis, 1981

Lakes to be drained will be drawn down slowly until just enough water remains that may be drained in one day. On the final day of the draining, fishermen with a valid state and Fort Gordon license will be allowed to remove all the fish they can from the drained lake.

After the lake is completely drained the remaining pools will be treated with chlorine or Rotenone™ to kill any fish that remain. Rotenone™ will be applied in the fall when water temperatures are between 65°F and 75°F. The rate of application will follow label and manufacturer instructions. Rotenone-treated water is detoxified after 3 to 5 days at water temperatures above 70°F. Detoxification takes longer at cooler temperatures. The lake will then be left empty of water for most of the winter season, which could help to control aquatic weeds. The lake will then be refilled and restocked with fingerling bass, bream and catfish at the appropriate time. The lake will remain closed to fishing for a minimum of one season to allow fish to grow. This program will be managed in such a way that a new lake will open to fishing while one lake is drained each year.

- Stocking - Bass, Bream and Catfish Lakes: Rates of stocking are determined by management practices to be carried out. The recommended rates for initial stocking for fertilized vs. unfertilized lakes are listed in Table 4-11.

Table 4-11. Stocking Rates for Fertilized and Unfertilized Ponds

Species	Rate per surface Acre for a Fertilized pond	Rate per surface acre for a Unfertilized pond
Bream (Bluegill 70 percent) (Redear sunfish 30 percent)	1000	500
Largemouth bass	100	50
Channel catfish	100	50

Source: Lewis, 1981

- Supplemental Stocking - To maintain populations of channel catfish within the lakes on Fort Gordon, supplemental stocking will be used. On a rotational basis, 6 to 9 inch channel catfish will be stocked in lakes and fed to allow for an increased harvest of this species. Fingerling catfish will not be used because most lakes on Fort Gordon are managed as multi-species lakes that already have established bass populations. These larger bass would rarely allow the immature catfish to survive. Supplemental stocking rates of 150 to 500 channel catfish per acre in an established pond are recommended (Henderson 1999).

Beginning in 1999, five lakes (Little Beaver, Big Beaver, Fettig, Claypit I and Howard) have received supplemental stockings of channel catfish annually. These fish were either purchased from a private vendor or provided by GADNR. Plans are to open one of these lakes at the beginning of each month during the summer, peak fishing season (May, June, July and August). Additional fish will be supplemented each year as fish or funds become available. Nine automatic feeders have been purchased and attached to docks in these lakes allowing for easy maintenance and filling with feed while using minimum labor. This will reduce the amount of time required to feed fish as feeders are filled only twice a month. Additional automatic feeders will be purchased, as funds become available.

- Cage Culture - In 1999, three cages stocked with 500 fingerling channel catfish each were placed in Little Beaver and Fettig lakes. These cages were placed near the automatic feeders so the fish would receive supplemental food. Once the fish have grown to a suitable size, approximately 6 to 9 inches, they will be released into lakes in need of supplemental stockings. The fish were provided by the GADNR at no cost to the installation. This may be expanded based on the success of this program and as more automatic feeders are obtained.
- Kids Fishing Lakes - Due to their small size and controlled location, Claypits I, II and III were chosen as the site for the bi-annual children's fishing rodeos. Claypit I, II and III are annually supplementary stocked with channel catfish which are supplied by the GADNR Fisheries Division at no cost to the Fort Gordon Fish and Wildlife Section; however, supplemental feeding is accomplished by Fort Gordon. These catfish are approximately 9 inches in length when stocked. Some of these lakes can be opened after the children's fishing rodeos; however, these lakes may only remain open for the remainder of the month following the children's event. Past events have had participation levels of 100 to 350 children between the ages of 4 and 15 years.

4.4.6.8 Feeding

Historically, the only lake receiving supplemental feeding was Claypit III, which was used exclusively for children's fishing rodeos. In 1999, automatic feeders were installed on two additional lakes, Little Beaver and Fettig. Since then nine additional feeders have been purchased and installed in other lakes receiving supplemental stockings of fish. Feeding will also be expanded as supplemental

stockings of catfish occur in additional lakes. Automatic feeders can provide 3 percent of the fish body weight in food on a daily basis, which is the desired rate of feed. These feeders are attached to docks and can be refilled with minimum effort and labor cost. This will allow for fast growth of fish and better sport-fishing opportunities in these lakes.

4.4.6.9 Fish Consumptions Guidelines

Fish caught on Fort Gordon are generally good quality and are safe to eat and provide an excellent source of protein. However freshwater fish may contain high levels of mercury, which can pose a risk to human health. Due to the presence of heavy metals and polyaromatic hydrocarbons, consumption advisories are posted for all lakes and streams on the installation. These guidelines will be posted on the yearly fishing schedule, the sign in boards, and on Fort Gordon's natural resources website. Guidelines for eating fish from Fort Gordon lakes and streams are provided in the Fish and Wildlife Plan (Appendix J).

4.4.6.10 Fish Kill Investigations

Should a fish kill occur in waters of the installation, the Chief of ED, will be notified immediately. The Field Manual for the Investigation of Fish Kills (USFWS Publication 177) will be used to assist in the investigation. In summary, an on-site investigation is made; water samples (and occasionally mud samples) are taken; and live and dead fish are collected. Water samples are tested for dissolved oxygen, pH, carbon dioxide, alkalinity, and hardness (all within in-house capabilities). Should a pesticide, oil, or other toxic agent be suspected of causing the kill, water and mud samples, and fish specimens will be forwarded to either a locally-contracted water analysis toxicology laboratory or to the United States Army Center for Health Promotion and Preventive Medicine for toxicological assessment. GADNR and USFWS Athens Office will be notified of all significant fish kills after the DPWL is notified.

A portion of live fish collected will be immediately preserved in a 10 percent formalin solution, while the remainder will be kept alive, if possible. Specimens will be saved for necropsy and microscopic identification of parasites and disease. Should a parasite or disease be identified as the cause of the kill, available treatments will be considered. In most cases, treatment of a moderate sized body of water is not economically feasible, and the fish kill is allowed to run its course. However, if a treatment is known and feasible, the pond will be closed and treated appropriately. Examination of the air bladder in fresh specimens is used to determine whether

explosives were used to affect the kill. Further pathogen identification is obtained from the state if necessary.

Best estimates of the numbers of fish, species composition, and length groups affected are determined. An estimate of the monetary cost of the fish kill is assessed. Fish count methods and monetary values are based on the American Fisheries Society Special Publication #13, Monetary Values of Freshwater Fish, and Fish-kill Counting Guidelines. These documents are incorporated here as references and copies are maintained at the ED. In the case of a large-scale fish kill, the Fish and Wildlife Section will notify the following individuals and agencies:

- Chief, NRB;
- Chief, ED;
- Director, DPWL;
- GADNR;
- USFWS, Athens Office;
- Game Wardens, Provost Marshal; and
- PAO.

Once the cause is determined, all appropriate groups will be notified. If it is determined that corrective action is economically feasible, corrective action will be taken. If mitigation is possible and required, appropriate measures will be implemented. The affected area will be closed to the public if deemed necessary from a public health or public relations standpoint.

4.4.7 Wildlife Management Practices

4.4.7.1 Habitat Development

In order to maintain and enhance the wildlife on Fort Gordon a variety of habitat types will be maintained. A greater variety of habitat types will allow for a greater diversity of wildlife species living on Fort Gordon. Most efforts are directed toward activities that will benefit multiple species, both game and nongame. A few species-specific activities will be utilized for the most popular game species on Fort Gordon.

<u>Prescribed Fire</u>

Prescribed fire is one of the most cost-effective methods to set back plant succession over large acreages. Featured game species with regard to prescribed fire are quail, turkey, and deer. The RCW is the primary featured species with regard to growing season burns, as described in Section 4.1 of this INRMP.

Prescribed fire is one of the most important tools utilized in quail management. Care must be taken to protect prime nesting areas (*e.g.*, plum thickets, etc.) by harrowing protective rings around these valuable sites. In pine habitat, prescribed fire benefits deer by improving the palatability and nutritional level of understory plants; reducing large, woody understory stems; encouraging production of new sprouts; reducing roughs that suppress forbs and grasses; keeping browse within reach of deer; and encouraging understory fruit and mast production.

The Fort Gordon forester and wildlife biologist work together to manage Fort Gordon's forests for the benefit of both game and nongame wildlife species.

Prescribed fire is also used for the prevention of large wildfires within impact and firing ranges. With a few exceptions for ranges and quail management areas most areas will be burned on a 3 to 5 year rotation. Fire maintains an open understory that will provide native grasses and legumes, recycle nutrients, and provide bare mineral soil for seed germination. These results will provide a valuable food source in seeds and bugging grounds for many animal species.

Prescribed fire will be one of the main techniques used in managing wildlife habitats. Burning has a positive impact on large areas with minimal cost therefore burning is one of the most beneficial management tools (Forest Service Southern Region 1989).

More detail can be found in Section 4.5 and Section 4.15 of this INRMP. All prescribed fires will be conducted in accordance with the IWFMP (Section 4.15).

Roads and Firebreaks

DPWL (base support contractor) has responsibility for maintenance of tank trails, training access roads and main roads (named earth). The Forestry Section of DPWL is responsible for timber and wildlife access roads and firebreaks. Both categories are important to natural resources management in that they are needed for natural resources management, wildfire suppression/prevention, and recreation access. However, the road network is most heavily utilized by the military to accomplish training missions. Best management practices (BMPs) (Appendix K) are an important aspect of roadwork to protect wetlands and water quality, and are followed by base support contractor, Forestry Section, and the DPWL. More detail can be found in Section 4.5.17.4 of the Forestry Management Section of this INRMP.

Native Grasses

Native grasses can be established in a variety of sites for erosion control, quail management, access road and logging deck closures, and stabilizing TAs, as well as restoring ground cover throughout the installation. Native grasses have a wide variety of benefits for wildlife and the ecosystem. First, they are native and non-invasive and they are difficult to establish in some areas but easy to control. They are part of the natural system and once established they are resistant to invasion, drought tolerant due to their root system, and can be burned or mowed in the off-season with no adverse effects.

Many native grasses grow in low fertility soils where other species have difficulty becoming established. Sand bluestem (*Andropogon hallii*) and coastal panicgrass (*Panicum amarum* var. *amarulum*) are among these. Native grass provides good cover for wildlife such as quail, rabbits, and grassland birds in two ways:

- They are primarily bunch grasses; the space between bunches allows smaller wildlife to run into and through the stand and forage easily in the open areas for seeds and insects.
- Many warm season grasses, such as big bluestem (*Andropogon gerardii*) and switchgrass (*Panicum virgatum*), grow 4 to 6 feet tall, easily tall enough to provide cover, even from aerial predators.

Native grasses typically have a well-developed seed head and provide good browsing and wildlife food. When combined with plants such as partridge pea (*Chamaechrista fasciculate*), superior food and cover can be achieved in one stand.

With a grain drill specifically designed to plant the fluffy native grass seed, areas will be planted as seed becomes available. Plantings will occur in early to mid-spring. The type of species to be planted and associated site quality is provided in Table 4-12.

Table 4-12. Native Grasses and Forbs Species to be Planted at Fort Gordon

Common Name	Scientific Name	Site Quality		
		Fertile	Infertile	Closed Roads
Coastal panicgrass	*Panicum amarum* var. *amarulum*		X	
Little bluestem	*Schizachyrium scoparium*		X	
Indiangrass	*Sorghastrum nutans*	X	X	X
Partridge pea	*Chamaechrista fasciculate*	X	X	X
Switchgrass	*Panicum virgatum*	X	X	X
Big bluestem	*Andropogon gerardii*	X		
Florida beggarweed	*Desmodium tortuosum*	X		X
Kobe lespedeza	*Lespedeza striate*			X

Fort Gordon 2008b

Native seeds from the Fort Gordon longleaf/wiregrass ecosystem can be collected and used to reestablish areas where the native ground cover has been lost. Efforts have been made and plans are to continue restoring native ground cover with seeds collected from Fort Gordon. Seeds can be collected using a tractor with seed collecting attachments in open areas large enough for equipment use. Seeds will then be stored until appropriate time for planting. Areas that might receive seeding could be forestry site prep areas or areas that have little or no ground cover in native pine stands. Seeds will usually be collected in the fall following a growing season fire where studies have shown this to be best for seed harvesting.

4.4.7.2 Ecosystem Restoration and Midstory Habitat Improvement

Fort Gordon is actively translocating RCWs to the installation. This activity requires artificial cavity inserts and understory control to restore habitat for use by the RCW. Details of the RCW translocation program can be found in Section 4.1 of this INRMP. Although the main reason for understory reduction is to increase and improve habitat for the RCW, many other species also benefit from this activity. By reducing understory, more light will be able to penetrate to the ground and encourage native grasses, forbs and shrubs that are used as a food source by

Roller Chopping Operation

many wildlife species. Areas to be treated will be surveyed to determine the quality of the existing ground cover which will aid in determining treatment method. The most effective, economical and ecological methods will be selected to provide the greatest benefit with the least harm to the environment. The following activities may be used in understory control.

Roller Chopping

In areas that scrub and turkey oak have greatly closed the understory, roller chopping will be used to knock down and break up the trees. Wherever roller chopping is used, equipment will run on long straight lines through the woods, to the extent possible, to minimize the need for turning and reduce the amount of ground disturbance. Survey plots can be established in areas before and after treatment to determine the success of roller chopping.

Herbicide

Herbicides may be used to kill hardwood species and open the upland pine forest and allow light to reach the forest floor. This will encourage the growth of native weedy ground cover that will benefit wildlife and remove understory to improve RCW habitat. Herbicides will be applied following the manufacturer's directions and application rates. All herbicides will be applied in accordance with DoD and other applicable laws and regulations.

Bush Hog/Flail Mowing

In areas where the understory encroachment is not as severe, or there is higher quality ground cover, mowing will be used to reduce understory vegetation. Rubber tire tractors using bush hogs and flail mowers will run along straight lines through the woods, to the extent possible, and clear understory vegetation. Tires on the tractors will cause less ground disturbance than roller chopping with bulldozers. Mowers may also be used in conjunction with roller chopping to clear areas closer to individual trees that cannot be reached by roller chopping.

Hand Clearing

Hand clearing may be used in areas where understory encroachment is very minor or to remove vegetation very close to the base of large trees. This will include the use of chainsaws, axes, and bank blades.

Maintenance

Once areas have been cleared of excess understory vegetation, fire will be primarily used to maintain the habitat in the more open setting preferred by RCW as well as other wildlife species. If fire fails to maintain the open understory, a site assessment will be conducted by the Natural Resources staff and additional appropriate control methods will be used.

4.4.7.3 Preston Drop Zone / Dove Field/ Shooting Preserve

The Preston Drop Zone must be maintained as an opening to allow for training of airborne troops as well as other troops. This area is also one of the most heavily used areas by sportsmen. It is used for dog field trials, and the FGSC's shooting preserve where ring necked pheasant, chukar and quail hunts are held. Approximately 100 acres of the drop zone was planted in Bahia grass during the winter of 1998 to be leased as a hayfield under the agricultural lease program. At the present time the field has never been leased. The drop zone will be mowed in late August to clear the ground and allow for the retrieval of doves during dove hunts.

The drop zone has also historically been the main site of the dove field on Fort Gordon. Incorporated into the design of the hayfield were strips left out for wildlife plantings. Due to increased training by Dobbins AFB in 1999, the wildlife strips in the drop zone may not be planted, depending on military activity in the future. Strips to the west of McDuffie Road and north of the drop zone will continue to be managed as dove fields. The strips at the northern side of the drop zone will be maintained in supplemental food plantings with the main emphasis on mourning doves. Corn (*Zea mays*), sunflowers (*Helianthus annuus*) and millet (*Panicum miliaceum)* are the main species planted, which are also used by songbirds, quail and turkeys. The large opening also provides good bugging ground for turkey. Rabbits also utilize the area. This open area also supports several species of hawks as well as two successful nesting boxes for the southeastern American kestrel. Additionally, part of TA 28 southwest of Gibson road landfill will be managed as dove fields.

4.4.7.4 Hardwood Mast Management

Hardwood mast is an important food source for deer, turkey, quail, squirrels, some ducks, and many nongame species. For optimum mast production, most oaks must be greater than 50 years old and have a DBH of 14 inches to 30 inches. A wide distribution of age classes should be available to ensure future mast production. Existing tree sites will be maintained by pruning and fertilizing when

necessary to increase tree vigor and mast yield. Areas similar to those described above are rare on Fort Gordon. Most large mast producing trees are located in the bottomlands or are associated with old home sites.

To maintain and increase the number of mast producing trees on Fort Gordon the following methods will be used. During tree marking for timber harvests, efforts will be made to release well formed, high mast potential hardwoods from pine competition. Old home sites with large mast producing hardwoods will be protected from prescribed fires. In areas where hardwood mid-story is being controlled for longleaf/wiregrass restoration, some small pockets will be maintained in upland hardwoods species such as post oak, turkey oak and bluejack oak. In some areas where hardwood trees are lacking, mast-producing species may be established. Native hardwood species suitable to habitat and soil type will be used. These mast producers will provide a supplemental food source for wildlife with less effort than required for the annual food plot planting. Efforts will also be made to restore native hardwood species within their natural range. Some native, mast-producing hardwood species that have been selected for restoration are white oak, swamp chestnut oak, and overcup oak (*Quercus stellata*). White oak will grow on a wide range of sites and therefore will be planted in a variety of habitat types. Overcup oak and swamp chestnut oak are more bottomland species with overcup oak being restored in the first bottoms where flooding is common. Swamp chestnut oak will be planted on the well-drained first bottom ridges (Burns and Hankala 1990).

4.4.7.5 Strip Disking

Disking is used to change the composition of plants and improve habitat for early succession wildlife species. Disking breaks up areas with thick mat-forming grasses. This enables seed producing plants to grow between parcels of thicker vegetation.

Where feasible, strip disking will be used to encourage weedy ground cover. This will produce brood and feeding habitat for quail, turkey, and songbirds. Disking is used to encourage the development of native food plants such as ragweed and partridge pea. In some pine plantations where trees are spaced far enough apart disking will be done to enhance quail habitat. Striping disking may be done in areas that have been thinned or burned, and/or within wind rows of older plantations. Disking during November through January will create brood habitat the following summer, therefore any areas such as food plots, skid lanes, logging decks, firebreaks, and open woodland patches near acceptable cover are suitable for this method of habitat management (Moser and Palmer 1997).

The Fort Gordon wildlife biologist manages the Installation's food plot program in support of hunting use and ecosystem management.

This technique not only aids in food production but increases "edge" which is very important in habitat management. Additionally, annual wildlife plantings in established clearings are planted on a rotational basis. This enables ground that was harrowed the previous year to produce native food plants the following year. Many preferred annual quail food plants seed in after disking.

4.4.7.6 Wildlife Clearings

The optimum amount of open area in a forest for wildlife is at least 5 percent of the total area with each opening being irregular in shape and 0.5 to 5 acres in size (GADNR unknown, Managing Openings for Wildlife). On Fort Gordon there are approximately 43,516 acres managed for wildlife and available for recreation. Therefore, the optimum amount of maintained open space is approximately 2,175 acres. In 1981, 2,400 acres were managed as wildlife openings on Fort Gordon. Due to lack of staff and money to manage that amount of land, a minimum of 800 acres of wildlife openings will be maintained to provide sites for feeding, strutting and nesting for all wildlife. This will give Fort Gordon approximately 2.3 percent of the total managed area in maintained openings. This amount is large enough to provide a benefit but small enough to be managed with current resources.

On an annual basis due to budget and time constraints approximately 800 acres will be managed annually in early succession habitat or planted with supplemental food sources for wildlife. Food plots can provide an important source of high quality food for deer when they need it most. Two percent of the land area in food plots can have significant impacts on deer harvest, population size, and condition. (GADNR 2003, Deer Herd Management for Georgia Hunters*).* Each year some clearings will be left unplanted while others will be planted with selected species to include: rye (*Secale* sp.), clover (*Trifolium* spp.), wheat (*Triticum ispahanicum*), winter pea (*Pisum sativum*), hairy vetch (*Vicia villosa*), brown top millet (*Panicum ramosum*), sorghum (*Sorghum bicolor*), chufa (*Cyperus esculentus*), oats (*Avena* sp.), corn, and partridge pea. These plantings will benefit both nongame and game species. Providing wildlife openings in all TAs, except those close to the cantonment area will encourage hunting pressure to be more evenly distributed over the installation.

Maintained food plot on Fort Gordon

Not all openings will be planted every year, some will remain fallow. Of the openings that are planted, usually 0.5 percent will be left unplanted. No new wildlife clearings will be established within the 200-foot buffer zone around a RCW cavity tree. However, those clearings that are already on the landscape or where recruitment clusters are being established can be maintained in early succession plants or planted in supplemental food sources. Wildlife clearings that are in close proximity to rare, threatened, or endangered species will be evaluated to determine species benefit. Many wildlife clearings are heavily used by gopher tortoise for foraging and burrowing sites. These clearings will be monitored and care will be taken to leave any burrows unharmed during normal operations. Typical planting schedules can be seen in Tables 4-13 and 4-14.

Table 4-13. Seeding Rates for Supplemental Food Plots, Fall Plantings

Crop	Seeding Rate	Approximate Planting Date
Rye	D[1]: 2-2.5 bu\A B[1] : 2-5 bu\A	Sept. 1 – Oct. 15.
Oats	D[1] : 3-4 bu\A B[1] : 4 bu\A	Sept. 1 – Oct. 15.
Wheat	D[1] : 2-2.5 bu\A B[1] : 2.5 bu\A	Sept. 15 – Oct. 15
Vetch, Hairy	D\B[1] : 20-30 lbs\A	Sept. 1 – Nov. 1.
Winter pea	D\B[1] : 30-35 lbs\A	Sept.1 – Oct 30.
Clover, Crimson	D\B[1] : 20-30 lbs\A	Sept.1 – Oct. 10.

Source: GADNR unknown
[1](B) Broadcast, (D) Drill, (bu) Bushel, (lbs) Pounds, (A) Acre.

Table 4-14. Seeding Rates for Supplemental Food Plots, Spring and Summer Plantings

Crop	SEEDING RATE	Approximate Planting Date
Corn	R[1]: 20,000 –24,000 seed\A	Mar. 15- May 10.
Browntop Millet	D[1]: 10-20 lbs\A B[1]: 20-25 lbs\A	Apr.1 – Aug. 15.
Japanese Millet or wild rice (waterfowl Mgt.)	D[1]: 15-20 lbs\A B[1]: 20-25 lbs\A	Apr. 1 – Aug. 15.
Pearl Millet	R[1]: 10-15 lbs\A B[1]: 20-25 lbs\A	Apr. 1 – July 15.
Proso	R[1]: 10-20 lbs\A B[1]: 20-25 lbs\A	Apr. 1 – Aug. 15.
Sorghum Grain	D[1]: 6-8 lbs\A B[1]: 10-12 lbs\A	Apr. 15 – July 15.
Iron clay pea/ soybean mix	D[1]: 60 lbs\A B[1]: 60-90 lbs\A	Apr. 1 – Sept.
Partridge Pea	D[1]: 5-10 lbs\A B[1]: 15-20 lbs\A	Mar. 1 – May 1.
Egyptian Wheat	10- lbs\A[1]	Apr. 1 - May 30.
Aeschynomene	20 lbs\A[1]	Apr. 1 – Aug 15.
Sunflowers	R[1]: 18,000 – 22,000 seeds\A	April - June
Chufa	D[1]: 25-35 lbs\A B[1]: 50-60 lbs\A	May 15 – June 30.

Source: GADNR unknown

[1](B) Broadcast, (D) Drill, (R) Rows, (bu) Bushel, (lbs) Pounds, (A) Acre.

Due to time and manpower constraints approximately 800 acres of maintained wildlife openings will be planted annually. Labor for the planting of food plots may be contracted out and performed under the supervision of a wildlife biologist. Some existing openings will be converted to perennial plantings such as white oak, sawtooth

oak (*Quercus acutissima*), bicolor lespedeza (*Lespedeza bicolor* Turcz.) and clovers, which will provide long-term supplemental food sources. Native warm season grasses will also be used to reclaim closed roads, for ecosystem restoration, and in plots that have been abandoned due to proximity of threatened or endangered species and RCW cluster sites.

4.4.7.7 Habitat Management for Game Species:

Due to the popularity of hunting for certain game species, specific management actions will be conducted to enhance and maintain the populations of those animals.

Deer

The white-tailed deer is the most sought after game species in Georgia and on Fort Gordon. The goals for management of deer on Fort Gordon are:

- Maintain a stable population at levels that allow for hunting opportunities within the carrying capacity of Fort Gordon;
- Maintain a population that supports an annual harvest of approximately 300 deer per year (based on the past 13 year harvest figures);
- Due to the number of deer related vehicle accidents, decrease the deer population around the cantonment area; and
- Increase the number of quality bucks in the SAIA by restricting the harvest of smaller immature bucks.

White-tailed deer have very definite habitat requirements. They prefer wooded areas especially hardwoods with lots of borders or edges created by natural breaks between vegetation types or by fields or small clearcuts. This type of habitat provides a variety of food sources and cover types. On Fort Gordon most large mast producing trees are located in the bottomlands or in association with old home sites. Browse plants are located in most habitat types and are encouraged by controlled burning and midstory control.

Three distinct management strategies are utilized on the installation:

- Population reduction. The deer population in and around the cantonment area has increased in the recent past due to the urbanization of adjacent private lands forcing deer onto Fort

Gordon where there is still available habitat. There are 14 TAs consisting of 4,617 acres under this type of management. Due to the large number of deer related vehicle accidents around the cantonment area, the deer population numbers need to be reduced. To decrease the population, archery hunting with harvest of either sex animals is allowed for the entire length of deer season. Control burning will be conducted in this area for fuel reduction and ecosystem restoration. A map of the archery only areas around the cantonment area is presented in Figure 4-8.

- Trophy management. Opened in 1998 after 9 years of closure, the SAIA is managed for trophy bucks (Figure 4-9). Due to the amount of time this area was closed to hunting and the size of the area (7,500 acres) it was assumed that the age structure of the buck population was already sufficient to support trophy management. A survey of hunters was conducted and of the 238 responses, 85 percent (202) favored trophy management in the area. Bucks harvested in this area must have antler requirements of at least four points on one side of the rack. Does may be harvested following post regulations and seasons. Harvest of does in the area is encouraged and should equal 60 percent of the buck harvest. To maintain this population, wildlife clearings, mineral blocks for antler growth and development, and mast production areas are managed. Controlled burning and midstory control are also conducted in this area.

- Maximum population harvest. The remaining amount of the installation (38,900 acres) open to hunting is managed under a maximum harvest strategy. In this type of management a large number of deer will be taken in the harvest. Young bucks will show good antler development and no damage to long-term food supply or carrying capacity will occur. Wildlife clearings, mineral blocks for antler growth and development and mast production areas are managed. Controlled burning and midstory control are also conducted in these areas. Wildlife clearings and food plots allow deer to use more habitats rather than be restricted to the bottomlands. The maintenance of these wildlife clearings will help spread hunting pressure throughout the installation.

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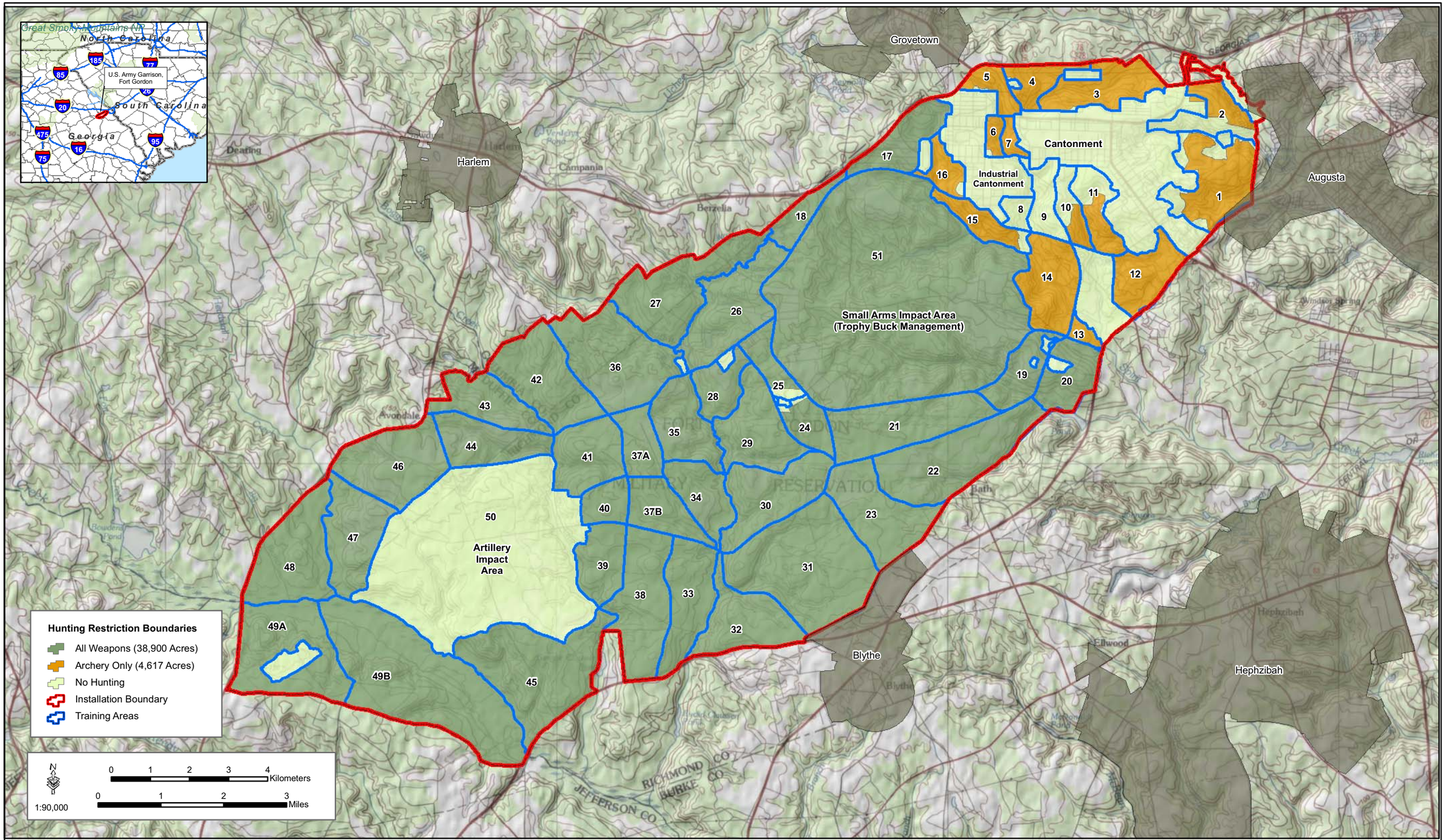

Figure 4-8: Hunting Restriction Boundaries on Fort Gordon

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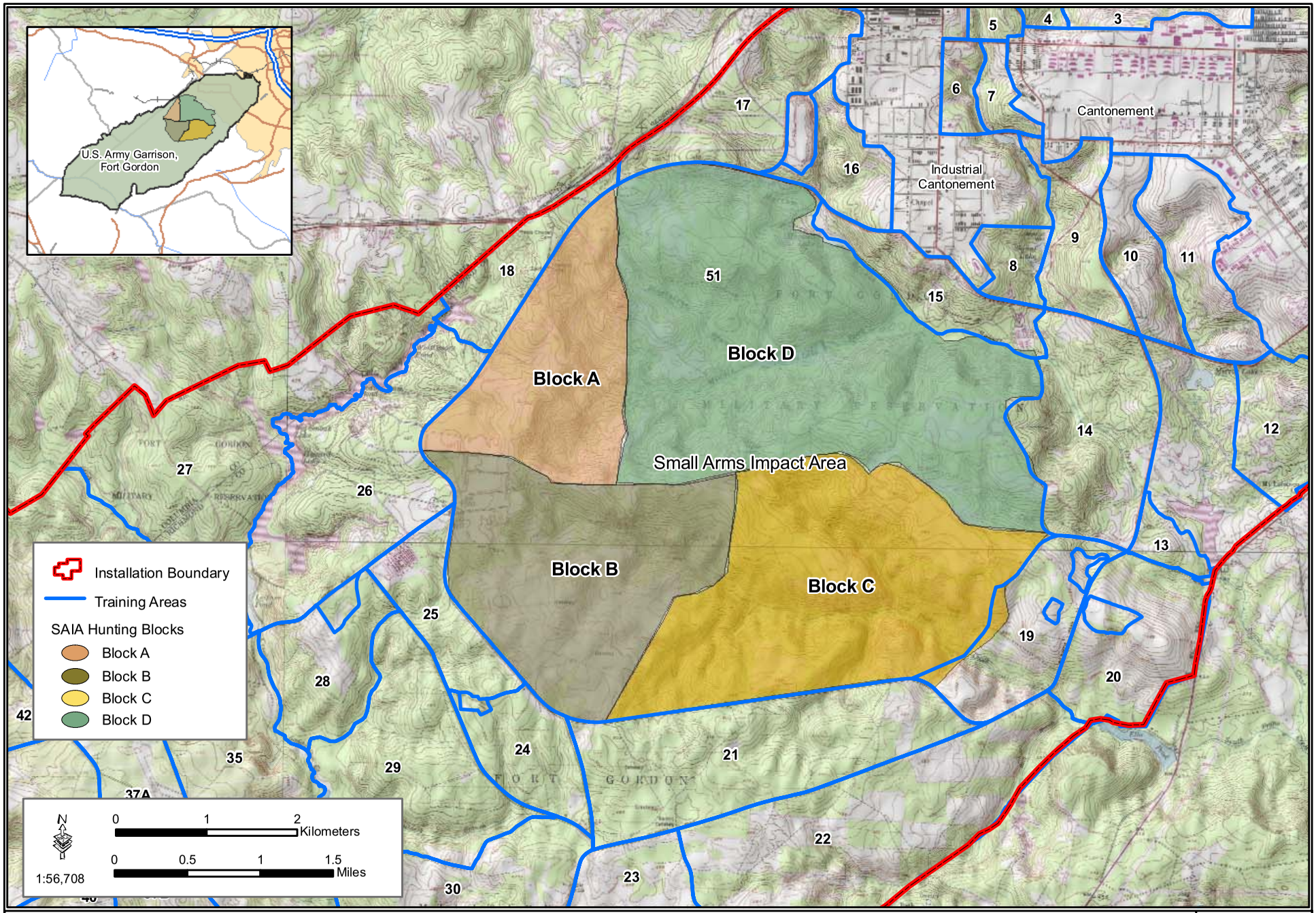

Figure 4-9: Small Arms Trophy Management Hunting Areas

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Turkey

Good wild turkey habitat contains mature hardwood stands for mast production; scattered conifers for roosting sites; open understories to take full advantage of the turkey's keen sight; scattered clearings for feeding; nesting and strutting areas, well distributed water supplies; sufficient prescribed fire to stimulate plant production, improve palatability, and nutrition; and reasonable freedom from disturbance.

Much of Fort Gordon has poor distribution of mixed hardwood species. Better diversity of hardwoods would help compensate for the high annual variability of mast production. Numerous old homesites containing live oak and water oak compensate somewhat for this shortcoming. Artillery firing points and wildlife clearings both fallow and planted with chufa, wheat or clover provide good breeding, nesting, bugging and brooding areas. Planting some forestry firebreaks with native warm season grasses further enhances brooding areas. Relatively open understories preferred by the wild turkey are lacking in many of the installation's woodlands.

Quail

Optimum quail habitat is characterized by good interspersion of woodlands, brush, grass, and cultivated lands. This describes the abundant, small farms that made up Fort Gordon before acquisition by the Army. Since then, many cultivated fields have seeded in with woody plants, and woodland canopies have closed significantly. Observations of individuals, who have worked and hunted on Fort Gordon for more than a decade, suggest that quail and other upland species have declined.

In order to reverse this decline, Fort Gordon will follow RCW management guidelines for burning and timber harvest. These actions should prove to be very beneficial for quail on Fort Gordon. Habitat management in areas outside the RCW HMU will stress early succession vegetation. Management initiatives include:

- Prescribed burning;
- timber management;
- maintaining openings;
- strip disking; and
- maintaining wildlife clearings.

Frequent burning favors the growth of annuals and results in a more open condition, which quail prefer. To provide optimum

habitat, especially in larger wildlife clearings and pine forest around dove fields in TA 23, 30 and 31, these areas will be burned on a 2 year rotation with half of the area burned in one year, and the other half burned the following year. Since effects of fire during the nesting season are poorly understood, burns will alternate between March (prior to the nesting season) and the peak lightning season (April through August). Lightning season fire will destroy some nests and chicks, but will achieve superior vegetation control and comply with endangered species and ecosystem management guidelines.

Timber management should follow the RCW guidelines and will promote open woodlands beneficial not only to bobwhite quail but also to wild turkey and RCW. Bobwhite quail prefer open woodlands with a basal area of approximately 25 to 30 ft^2/ac. However, since RCW management guidelines require that upland woodlands be maintained between 50 and 80 ft^2/ac of BA, the optimum BA for bobwhite quail will be achieved only in areas where training requires such a low BA.

Strip disking will be used to set back biological succession and provide quail with access to dense fields during brood-rearing season.

Maintenance of wildlife clearings planted with sorghum, millet, partridge pea, wheat, sunflowers, or native warm season grasses in areas throughout the installation will ensure an ample food supply for quail. In addition, the dove field is planted annually with brown top millet, corn, and dove prozo which can be used as a food source by quail. To increase quail use of these fields, the surrounding forest will be thinned to a BA of 50 ft^2/ac, and escape cover will be increased.

This habitat management should significantly benefit bobwhite quail. In many ways Fort Gordon is implementing classic southern quail management (*i.e.*, open stands of older-aged timber with a vegetated understory).

Doves

Mourning dove is a highly mobile species, and local habitat conditions do not limit the total population; however, providing good habitat year round can increase local populations. Dove management depends primarily on concentrating their numbers during hunting season and adjusting annual hunting regulations. Dove fields will be established annually using brown top millet, corn, sunflower, and other plantings. Fields to the East and West of the Preston Drop Zone will be planted to serve as areas for dove hunters. Within the next 5 years, increases in the training mission of the Preston Drop Zone will require it to be expanded. The Fish and Wildlife Section and DPTMS (Range Control) will coordinate and adjust areas that will be maintained as wildlife clearings large enough to support dove hunting (at least 85 acres). Large areas of the Preston Drop Zone can be managed as a wildlife clearing that supports wildlife and hunting as well as maintaining it in an open field compatible with and supportive of military air drops. This area is divided into two sections with the northwestern section being set aside for military training and the southeastern section set aside for wildlife clearings that can support dove hunting. A smaller secondary field in TA 28 is managed for doves.

Dove hunting on Fort Gordon

Waterfowl

Nearly all bottomland hardwood stands on Fort Gordon contain some oak species for mast production, which is an important food for some duck species, especially wood ducks. Additionally, many of the controlled lakes and beaver ponds serve as roosting and nesting areas. However, there are nonforested areas of the controlled lakes, which are preferred habitats for some waterfowl species. Thus, the numbers of ducks on Fort Gordon is extremely

variable. Two lakes, Lower Leitner and Union Mill, are managed for waterfowl under the Waterfowl Habitat Enhancement Project Concept and Management Plan (Jensen 1997). Lakes are drawn down in the summer to allow for vegetation to grow around the edges. In the fall the lakes are flooded to allow access to this food source by ducks. Also, Japanese millet (*Echinochloa esculenta*) and rice (*Oryza* sp.) have been planted on the edges of these ponds during drawdown to provide supplemental food in the fall of the year. Wood duck nest boxes are a useful management tool that has been historically used on Fort Gordon. In late winter (December through January) each year, wood duck boxes should be monitored for usage and maintained as needed. In 1999, 55 new wood duck boxes, in cooperation with Waterfowl USA, were placed around Fort Gordon to increase the nesting success. More wood duck boxes will be installed, maintained, mapped and monitored as time and funds become available.

Cottontail Rabbits

Cottontails thrive in openings where shrubs, grasses, and forbs dominate and in woodlands with fairly open canopies (40 to 50 percent crown closure). This level of canopy closure allows sufficient sunlight to reach the forest floor to produce desirable grasses and forbs. A major limiting factor for rabbit populations on Fort Gordon is the high degree of pine crown closures (greater than 75 percent are common). Prescribed fire, which improves nutrition and palatability of food plants, is of little benefit where crown closure prevents the growth of food.

Habitat management techniques, such as mowing, harrowing, planting, thinning of pine plantations, and prescribed burning benefit cottontail rabbits. The Preston Drop Zone, ranges, clearings, and artillery firing points that are dominated by shrubs, grasses and forbs provide good habitat. Pine woodlands of fully stocked pole and sawtimber stands shade the forest floor, inhibiting the growth of adequate succulent forage. Consequently, areas most suitable for rabbits shift throughout the installation as pine stands are altered.

Eastern Gray Squirrel

Productive gray squirrel habitat contains a wide variety of mast-bearing hardwood trees; fruit producing trees and shrubs; flowers, buds, and cones in addition to adequate den cavities for escape, shelter, and raising young. Diversity of heavy seeded mast producers is limited with the majority being red oaks, with some white oaks and hickory. Many of these trees are too young for

optimum mast production, since this is achieved at 50 to 125 years of age (14 to 30 inch DBH).

To aid in the management of the eastern gray squirrel and other species that require mast, a minimum of 20 percent of each square mile will have hardwood production, with at least 50 percent of this acreage in upland hardwoods. Diversity of hardwood species should be maximized with oaks, hickory, dogwood, maple, yellow-poplar, magnolia, black gum, etc. being protected for mast production. In addition to mast, a sufficient number of hardwood snags greater than 40 years old must be preserved throughout the habitat for den sites, since litters raised in den cavities experience a much higher survival rate than those raised in leaf nests. Prescribed fire has little application in gray squirrel habitat management.

Fox Squirrel

In contrast to the gray squirrel, fox squirrels prefer open park-like woods with sparse vegetation. Since the fox squirrel is adapted to ground movement, it uses widely scattered hardwoods in pine uplands. Mast trees of optimum age (50 to 125 years) and optimum DBH (14 inches to 30 inches) for maximum mast production are limited.

Management strategy for fox squirrels favors stands of mature pine preferably longleaf, with scattered pockets of hardwoods, which are essential for dens and food diversity throughout the year. At least 0.25 acre of hardwood converts should be maintained for every 5 acres of fox squirrel habitat. Scattered oaks throughout upland pines should also be protected. Snags are left for den sites, except in the cantonment area. Prescribed fire can be utilized every 3 to 5 years to maintain ground foraging habitat.

4.4.7.8 Monitoring

Key information needed to successfully manage a population of wildlife is to estimate/know population size, sex ratio, mortality, natality, and age distribution. To help accomplish this task the following population census and/or sampling methods will be used.

- White-tailed deer - In the early fall of each year (mid September) a spot light survey will be conducted to estimate the deer population. A sampling method similar to that used by the Texas Parks and Wildlife Department will be used (Appendix L).

Monitoring affected species is vital to adaptive management.

This information along with check station sampling of harvested deer and record on the number harvested will aid in making decisions concerning deer herd management (*e.g.*, increase or decrease the number of either sex days). Check station sampling will also collect weights, meat tissue samples, jawbones to determine age, and antlers measurements of bucks to monitor health of the deer herd.

- Wild Turkey - In the spring of each year a gobbler census will be conducted to estimate relative abundance of the turkey population. This index, combined with observations of nesting success (*i.e.*, brood surveys) and harvest records, when compared to data from past years will enable Fish and Wildlife Section biologists to monitor turkey population trends.
- Bobwhite Quail - To monitor quail population a whistle count can be used (Appendix M), as well as, winter covey counts. With annual population data biologists can examine quail population trends. These counts will be established in areas where thinning of timber and prescribed fire are being used to restore the longleaf ecosystem and in areas before scheduled thinning operations to help quantify the success of various quail management practices.
- Other Species - From time to time several other species of animals may be surveyed. The most appropriate method to obtain the most accurate data will be used to accomplish these surveys. These may include mist net sampling for bats or birds; time area counts for birds; drift fence trapping for reptiles and amphibians; live trapping for small mammals; and participation in the Georgia Breeding Bird Atlas program.

4.4.7.9 Nest Boxes

Nest boxes provided for several species on the installation will be maintained, monitored, and for some species, increased. The American kestrel nest box program has been very successful and the current boxes will be cleaned each spring before mating and maintained (see Figure 4-5). Bluebird boxes installed to help reduce competition for the kestrel boxes will be replaced as needed. The bat house program will increase with the addition of a few more boxes. These will be monitored for success at a maximum rate of once a month. The wood duck box program will continue with the placement of new boxes and maintenance on existing ones.

4.4.7.10 Harvest of Game

To help maintain stable populations of game species, hunting seasons will be opened annually. These seasons and bag limits will, for the most part, follow those set by the GADNR. All game harvested will be accounted for on harvest records kept at the sign in/sign out boards operated by the installation Game Wardens. Additionally jaw bones and antler measurements may be taken on deer harvested.

4.4.7.11 Control of Nuisance Wildlife

Several species of wildlife cause nuisance problems from time to time and will be managed using integrated pest management (IPM). Beavers (*Castor* spp.) have in the past dammed low water crossings causing roadways to become impassable and damaged trees at places like the Gordon Lakes Golf Course. Beavers are typically controlled by use of conibear trapping. Alternatives such as pipes under beaver dams (*Clemson Beaver Pond Leveler*) may be used but will not negate the need to trap some animals. Beaver trapping will be done in accordance with the beaver trapping Standard Operating Procedures (SOP) found in Fort Gordon's Installation Pest Management Plan (IPMP, Section 4.9).

Other animals such as skunks are trapped with live traps (*i.e.* Hav-a-Hart trap) and can be relocated to an area that will not be a problem or euthanized. Canada geese (*Branta canadensis*) complaints at the golf course and Boardman Lake area have been increasing in the recent past. Nuisance geese will be trapped during their molting period and relocated to an area of the installation away from their capture site or coordinated through GADNR for a release site. The golf course has also acquired and used a dog to keep geese in the water and off the course.

Feral dog complaints will be handled by the Game Warden's section. Feral cat problems are handled through the post Pest Control Office. For more information regarding feral dogs and cats see Section 4.9.

4.4.8 Personnel Responsibilities

The U.S. Army Garrison, Fort Gordon is directly responsible for the implementation and enforcement of the Fish and Wildlife Management Plan. The responsibility of installation stakeholders was discussed in detail in Section 1.4.

4.4.9 Outside Assistance

The planning and management of natural resources on Fort Gordon is a collaborative effort that requires assistance from Federal and state agencies, educational institutions, contractors, and other interested parties. The responsibility of external stakeholders (i.e., USFWS and GADNR) was discussed in detail in Section 1.4.2 and beneficial partnerships are discussed in detail in Section 3.4.

4.5 FORESTRY MANAGEMENT

4.5.1 Mission Statement

To manage the installation's forests to support the military mission while supporting the management of endangered species, ensuring the protection of the environment, and providing a sustainable income from the sales of forest products to support the program.

4.5.2 Plan Objective

The Fort Gordon Forest Management Plan (FMP) is intended for use by forest resource managers and other responsible parties as a planning tool and guidance for conducting sound forest management practices on Fort Gordon. This management plan covers the period of FY 2009 through FY 2013.

The forest management program is administered by the Forestry Section, Natural Resources Branch, Environmental Division of the Directorate of Pubic Works and Logistics. Plan implementation and oversight will be coordinated by the Forestry Section using available personnel, contracts, interagency agreements, and local installation expertise as available. Forest product markets, labor availability, funding constraints, other natural resources needs and training requirements will most certainly influence the intensity and timing of management activities. In order to be practical and functional, this plan is intended to provide flexibility to accommodate these conditions while insuring that it meets, supports, and enhances the installation's mission.

The activities described herein provide a framework for the orderly and scientific management of the installation's woodlands. The primary objective and goal is to provide a viable and healthy forest ecosystem that supports and enhances military training while providing for a sustained yield of quality forest products, the protection of real property, and the enhancement and protection of other natural resources associated with forest ecosystems.

All actions and activities covered by this plan will be carried out in accordance with all applicable Fort Gordon, U.S. Army, DoD, Federal, state, and local laws and regulations.

4.5.3 General Information Inherent to the Forest Management Plan

4.5.3.1 Definitions

Definitions of technical terms used in this plan are included in this section. Although many of the definitions have been taken directly from The Dictionary of Forestry (Helms, 1998), a number of the definitions have been constructed to define the term's actual intent as used in the Fort Gordon Forest Management Program.

Backfire – A fire intentionally set to move against the wind and "back" into an area to subdue a wildfire or for management purposes.

Basal Area – The cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area, usually per acre.

Best Management Practices (BMPs) – A practice, or combination of practices, that is determined after problem assessment and examination of alternatives, to be the most effective, practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality.

Biodiversity – The variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global.

Board Foot – A lumber measurement defined as being a piece of sawn wood measuring 1 inch by 1 foot by 1 foot. The term is also used as a measure when estimating the amount of lumber in trees, sawlogs, and veneer logs.

Chain – A unit of measure equal to 66 feet commonly used by foresters. A square chain (66 feet by 66 feet) is equal to 1/10 acre.

Chip – A small piece of wood used to make pulp or wood composites (made either from wood waste in sawmill or pulpwood operations or from pulpwood specifically cut for this purpose) or fuel (made either from sawmill waste or from chipping trees in the woods).

Chip-n-saw – Generally, pine trees larger than pulpwood size, but smaller than sawtimber trees (often between 9"- 12" DBH). A process whereby small logs are converted into cants by chipping the outer portion of the log, and then the cants are sawn into lumber as part of the same operation.

Clearcut – A silvicultural practice in which all-merchantable trees are harvested over a specified area in one operation.

Commercial Forestland – Forestland, which is capable of producing timber for industrial use. Areas qualifying as commercial timberland have the capability of producing in excess of 20 cubic feet (⅓ to ½ cord) per acre per year of wood.

Competition – The struggle among individual trees and between trees and other vegetation for growth requirements such as sunlight, nutrients, water, and growing space. Competition goes on among both the roots and crowns of trees in the same stand.

Conservation – The protection, improvement, and wise use of natural resources to provide the greatest social, economic, and environmental value for the present and future.

Controlled Burning – Any burning that has been started intentionally by a forest manager to accomplish some particular purpose, and over which he/she exercises some surveillance or control.

Cord – A volume measure of wood. A standard when cut and stacked is 4 feet by 4 feet by 8 feet, or 128 cubic feet of space. Cord volume in standing trees averages 70 to 90 cubic feet, because only the tree volume is measured - not the tree volume plus the empty spaces that form when the wood is stacked. Pulpwood volume is typically measured in cords. A face cord or short cord is 4 feet by 8 feet of any length wood less than 4 feet and is often the measurement used for firewood.

DBH – Abbreviation for tree diameter at breast height (4½ feet above the ground). DBH is usually measured in inches.

DIB – Abbreviation for tree diameter inside bark. DIB is usually measured in inches.

Ecosystem – A spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the biotic environment within its boundaries – note an ecosystem can

be of any size, e.g. a log, pond, field, forest, or the earth's biosphere.

Even-aged Forest – A forest containing trees that are about the same age (usually within 10 years). Pine plantations are even-aged forests that result from clearcut harvesting and reforestation with seedlings.

Final Harvest – The last harvest of trees from an area in preparation for regeneration of the area.

Forester – A professionally trained individual who supervises the development, care, and management of forest resources to include timber, soil, water, wildlife, and recreation.

Forest Management – The science, the art, and the practice of managing the natural resources that occur on or in association with forestlands. The practice of forest management on Fort Gordon will support the achievement of installation and Army goals.

Forest Products – All plant materials in wooded areas that have commercial value.

Fusiform Rust – A fungus infection that causes cankers, or swellings on the stems and limbs of pine trees. Although sometimes fatal to the infected tree, it often slows growth, provides an entry site for insects, and reduces the value of the infected tree.

Group Selection – A modification of the singletree selection method whereby trees are removed in groups or patches ranging ¼ to 2 acres in size and distributed throughout the stand.

Hardwood – A loose term generally including all species of trees that lose their leaves in winter. Some hardwoods, such as magnolia, retain leaves throughout the year. Soft hardwoods are soft-textured hardwoods, such as maple, hackberry, sweetgum, yellow poplar, magnolia, blackgum, and sycamore. Hard hardwoods are hard-textured hardwoods, such as hickory and oak.

Harvest – Removing trees on an area to (1) obtain income from the wood products, (2) develop the environment necessary to regenerate the forest.

Headfire – A fire moving with the wind. Head fires can be dangerous in a wildfire situation.

Heartwood – The wood extending from the pith to the sapwood, the cells of which no longer participate in the life processes of the tree. Heartwood may contain phenolic compounds, gums, resins, and other materials that usually make it darker and more decay resistant than sapwood.

Herbicide – Any substance or mixture of substances intended to prevent the growth of or destroy unwanted trees, bushes, weeds, algae, and other aquatic weeds.

Improvement Cut – A type of intermediate harvest that improves the residual stand by removing low quality, diseased, and/or damaged trees. Improvement cuts remove small, undesirable trees and other vegetation that could harm the stand as it grows. This type of cut may or may not provide a marketable wood product.

Landing – A concentration area close to a main road where logs are brought during harvesting operations. Trees are skidded to the landing and then delimbed, bucked, and loaded onto trucks for transport to the mill. Also called a deck.

Line-plot Survey – A sampling procedure employing lines of sample plots generally laid out at regular intervals along survey lines.

Logging Slash – Unwanted and generally unmarketable wood such as large limbs, tops, cull logs, and stumps, that remain in the forest after timber harvesting.

Log Rule – A table providing estimates for the amount of lumber that can be sawn from logs of a given length and diameter. There are three common log rules used in the United States they are the Doyle Rule, International Rule, and Scribner Rule. The Scribner Log Rule is used on Fort Gordon.

Lump Sum Sale – A sale where a specified volume of a forest product is sold for a fixed price before harvesting begins. With a lump sum sale, a fixed price will be paid regardless of the volume of forest product actually removed from the tract.

MBF – Abbreviation for a thousand board feet.

Merchantable Height – Refers to the height (length) of a merchantable tree from a point six inches above the ground line to a point on the trunk where the diameter becomes too small to obtain a particular product. The product being cut from the timber determines the merchantable height. For example, if the minimum usable diameter of pulpwood is 4 inches, the merchantable height

of a pulpwood tree would be its height up to a stem diameter of 4 inches.

Merchantable Timber – A stand of timber of sufficient size and volume per acre to be harvested profitably.

Midstory – Small trees growing under a forest canopy.

Mortality – Death or destruction of forest trees because of competition, disease, insects, wind, fire, or other factors.

Multiple Use Forest – A forest that is managed for a multiple of objectives, such as military training, timber production, endangered species, wildlife habitat, recreation, and aesthetics.

Natural Regeneration – Allowing the crop trees to regenerate an area. The two methods used to naturally regenerate pines on Fort Gordon are seed trees and shelterwood.

Natural Stand – A stand of trees resulting from natural seed fall or sprouting.

Needle Cast – (1) A disease of needle bearing conifers. The first indication of the disease is a discoloration and browning of the needles. Trees are seldom killed from this disease. (2) Also refers to the loss of needles on pine during periods of drought. This condition is common in longleaf pine and happens frequently in areas of soil compaction such as lawns and road shoulders.

Non-Commercial Species – Tree species of poor form, or inferior quality which normally do not develop into trees suitable for wood products.

Non-Commercial Thinning – Also referred to as precommercial thinning. A thinning that produces no marketable timber; usually because the trees have not reached a merchantable size; and costs managers in time and/or money to conduct.

Overstocking – Refers to a forest that contains too many trees per acre as determined by a tree's size and physical needs to remain healthy. Overstocking reduces growth, causes more trees to die, and makes the stand more susceptible to disease and insects.

Pesticides – Chemicals used to control forest pests. These include herbicides and insecticides, which are used to kill pests such as weeds, insects, and unwanted trees.

Pine – A descriptive name given to a particular group of needle bearing trees. In the Southeastern states, they are known for their valuable lumber and pulp qualities. Pine species that occur naturally on Fort Gordon are longleaf, loblolly, shortleaf, and pond pines. While not native on Fort Gordon stands of slash, sand, and Virginia pines are growing on the installation.

Plantation – A forest stand established by planting. It is usually made up of a single species.

Planting Machine – A mechanical device used to plant trees. Planters are usually pulled by tractors, skidders, or dozers on well-cleared sites.

Pole – Term used to designate trees that can be used as power poles. To be a pole a tree must be of above average straightness and quality and have three times (in feet) its DBH (in inches) in clear, straight stem. That is a 12-inch DBH tree must have at least 36 feet of clear, straight stem to be considered a pole. Poles may be expected to bring a 20-25 % premium if they occur in enough quantity and frequency to be worth sorting.

Precommercial – When referring to a tree it means that the tree has not reached a minimum DHB and height at which it is commercially harvestable. The current minimum DBH is 5 inches and the height is 20 feet to a minimum top DIB of 3 inches. The minimum DBH occasionally fluctuates with market conditions.

Prescribed Burning – The controlled use of fire to achieve forest management objectives. Prescribed fire can be used to reduce hazardous fuel levels, to control unwanted vegetation, improve visibility, improve wildlife habitat, and prepare soils for seed fall in natural regeneration.

Pulpwood – Wood cut or prepared primarily to make wood pulp, paper, fiberboard, or other products. Trees over 5" DBH that are unsuitable for sawtimber because of size, crook, or other defect are sold as pulpwood.

Reforestation – Re-establishing a forest by planting, seeding, or natural regeneration methods on a harvested tract of land.

Regeneration – (1) To re-establish a stand of timber, and (2) The seedlings that have been reestablished on a harvested site.

Regulated Forest – A forest being managed technically by controlling composition, stocking, harvests, growth, and yields to meet management objectives.

Reimbursable – Refers to those operations or activities that can be financed with reimbursable forestry funds.

Reimbursable Forestry Funds – Those funds that are derived from the proceeds from the sale of forest products. Only those expenses that are directly related to the management of the forest ecosystems on commercial forestland and can reasonably be expected to produce forest revenues may be reimbursed from sale receipts and include: timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment and supplies, disease and insect control, planning, timber marking, inspections, sales preparation, training of forestry personnel, and timber sales.

Rotation – The period of time between the establishment of a stand and final harvest

Salvage Cut or Harvest – Harvesting dead trees or those in danger of being killed (by fire, insects, disease, flooding, etc.) to save their economic value.

Sanitation Cut or Harvest – Harvesting of trees infected or highly susceptible to insects or diseases to protect the rest of the forest stand.

Saplings – Live trees of commercial species that are 1.0" to 5.0" in diameter at breast height and of good form and vigor.

Sawtimber – Trees or logs cut from trees with minimum diameter and length and with stem quality suitable for conversion to lumber.

Scrub oak – Small or stunted oak tree species, normally found in poor, dry sandy soils and generally of non-merchantable size and quality.

Seedling – A young tree less than 1.0 inch in diameter at DBH. Seedlings are usually less than three years of age.

Seed Tree Cut or Harvest – A type of regeneration harvest where between 5 and 10 trees are left per acre to provide a seed source on the harvested tract. Trees left for seed should be of superior

quality, healthy, and vigorous seed producers. In most cases, the old stand is partially removed in a single harvest cut that leaves only the seed trees standing. These remaining trees are left for three to seven years until the stand of seedlings becomes established from seed. After the new stand is established, the seed trees are harvested, leaving the young seedlings to produce a new even-aged stand of timber.

Shelterwood Cut or Harvest – Similar to the seed tree harvest, the shelterwood cut leaves between 30 and 40 trees per acre on a tract to act as a seed source. The greater number of trees reduces the chance of loss or damage through wind-throw and insures better seed dispersal. In addition, when the timber is harvested the landowner can expect to receive more money because of the greater volume available for harvest.

Silviculture – The art and science of controlling the establishment, growth, composition, health, and quality of forest and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Singletree Selection – Individual trees of any or all size classes are removed at a conservative rate in a manner that promotes growth of remaining trees and forest sustainability. Only those trees that need to be removed to improve the development of the stand toward a continuous or perpetual forest are marked for harvest. From a regeneration standpoint, in most cases, tree removal will be used to release established regeneration rather than to create openings for regeneration to become established.

Site Index – A species-specific measure of actual or potential forest productivity (site quality), expressed in terms of the average height of trees included in a specified stand component at a specified index or base age.

Site Preparation – Hand or mechanized manipulation of a site, designed to enhance the success of regeneration – note treatments may include burning, chemical spraying, chopping, disking, and scarifying and are designed to modify the soil, litter, or vegetation and to create microclimate conditions conducive to the establishment and growth of desired species.

Softwoods – A tree belonging to the order Coniferales, usually evergreen, cone bearing, and with needles or scale-like leaves such as pine, spruces, firs and cedars; often called "softwoods." Baldcypress is a deciduous conifer.

Stand Density – A measure of the amount of timber growing on a site expressed in number of trees, basal area, or volume.

Stocking – The number of trees in a forest stand. Often, stocking level is compared to the desirable number of trees for best growth and management, such as partially stocked, well stocked, or over-stocked.

Succession – The replacement of one plant community by another until ecological stability (climax forest) is achieved. For example, an abandoned farm, if left to nature, would gradually go through different states of vegetative cover and finally reach the climax forest stage after 100 or more years.

Stand – An aggregation of trees or other growth occupying a specific area and sufficiently uniform in composition (species), age arrangement and condition to be distinguishable from the forest or other growth on adjoining areas.

Stand Structure – The horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers, and stems of trees, shrubs, and herbaceous understory, snags and down woody debris.

Sustainable – The ability of a resource to continuously maintain itself in perpetuity without substantial loss.

Sustained Yield – The production of renewable resources a land area can maintain in perpetuity at a given intensity of management without impairment of the resource.

Tally – Counting trees, logs, or other products to use later in determining harvestable volume mid products.

Thinning – Removing some of the trees from a stand to encourage growth among the remaining timber. Commercial thinnings provide some financial return, while noncommercial thinnings do not. Methods used for thinning timber include row thinning where every third or fifth row of trees is harvested, selection thinning where only selected trees are harvested, and combination thinning where both row and selection methods are used.

Timber Cruise – To inventory a stand of timber to determine the harvestable products and volume.

Timber Marking – Selecting and indicating, usually by a paint spot, trees to be cut or left in a harvesting operation.

Timber Stand Improvement (TSI) – Improving the quality of a forest stand by removing cull trees and brush, leaving a stand of good quality trees. Cull trees may be removed by chemicals, fire, girdling, cutting, mechanical means, or a combination of these methods.

Tree Length – An entire tree, with the exception of the stump, unmerchantable top and branches, and foliage. Also relates to a logging (harvesting) system whereby the entire stem to a minimum diameter at the top-end is cut and hauled to the receiving mill.

Understory – Small trees and shrubby plants growing under a forest canopy.

Uneven-aged Management System – A planned sequence of silvicultural treatments designed to maintain a continuous forest of multiple age classes, while considering values other than just timber production.

Uneven-aged – Applied to a stand in which there are considerable differences in the age of the trees, usually more than 10 years, and in which three or more age classes are represented.

Veneer – A thin layer or sheet of wood. There are three common types of veneer. These are rotary cut, sawed cut, and sliced cut veneer. Pine veneer is made into plywood, while hardwood veneer is often used for furniture and cabinets.

Volume Table – A table that provides estimates of the average volume in cords (for pulpwood) or board feet (for sawtimber) in a single tree of a certain diameter and height. Volume tables are used with timber cruise information to develop a timber inventory report.

Water Bar – A hump or small dam-type surface drainage structure used in closing abandoned roads, skid trails, and firebreaks.

Water Turnout – The extension of an access road's drainage ditch into a vegetated area to provide for the dispersion and filtration of storm water runoff.

Whole-tree Chipping – A harvesting process of converting whole trees into chips for use as pulp material or fuel for energy. This

system can result in substantially lower reforestation costs than conventional harvest systems.

Wildfire – Fire burning out of control, regardless of how or why they started. See prescribed burning.

Wildland Fire – Wildland fire commonly refers to any nonstructural fire, except prescribed fire, occurring in wildland. For the purposes of this plan and fire management on this installation wildland fire will refer to any nonstructural fire, to include wildfire and prescribed fire, occurring in wildland.

Windrow – Logging debris and unmerchantable woody vegetation, which has been piled in rows to decompose or be burned; or the act of constructing these piles.

4.5.3.2 Forest and Fire Management History

Forest Management before Army Acquisition

A detailed description of the pre-Army history of the Fort Gordon area is provided in Section 2.1.3.1 of this INRMP.

Timber Harvesting since Army Acquisition

According to incomplete records, the first timber harvesting after acquisition was done in FY 1946, when 1,000 thousand board feet (MBF) (presumably pine) was cut and an income of $10,000 shown. Apparently, this was a procurement cut, as is shown for FY 1948, when 1,200 MBF was harvested and an income of $21,000 shown. The first USACE timber harvest contracts were documented in FY 1952 and FY 1954, with annual sales commencing in FY 1956.

Fire Management before Army Acquisition

There is very little recorded fire history of the area before Army ownership. Some researchers believe that lightning-caused fires played a significant role in the development and renewal of fire dependent ecosystems such as the longleaf pine ecosystems found in this area. Archaeologists believe that prehistoric Native Americans indigenous to this area used fire to maintain open areas for crop production and to open forested areas to ease wild game harvests. This use of fire by Native Americans also helped to sustain fire dependent ecosystems. In the late 1800s and early 1900s, fire was a tool used in agriculture to keep fields clear and woodlands open for livestock grazing in many parts of the

southeast. There was little or no organized forest fire protection in the area.

Fire Management since Army Acquisition

The fire history of the installation is incomplete, as there was no organized forest fire protection before 1952. Through late 1956, most forest fires were reported to the Post Fire Department for action. The Fire Department did not maintain any written record of these fires, which were apparently quite frequent. In 1952 a Forestry Section was organized; however, communications between the lookout tower and personnel were practically nonexistent, and as Post Forester turnover was rapid, the entire effort was disorganized and relatively ineffective until 1956. There are indications and recollections that several fires in the past exceeded 10,000 acres in size. One of note in March 1950 burned over 15,000 acres, with an estimated damage of more than $300,000. This fire was set by the Fire Department, under direct orders of the Post Commander, to burn off an area on the south boundary along U.S. Highway 1. Soon after ignition, winds up to 28 miles per hour (mph) from the south-southwest were experienced. The fire raged out of control and reached the main cantonment area, 12 miles away, the first afternoon. A wind shift to the north-northwest the next day drove the fire across U.S. Highway 1 onto private property. The fire continued to burn virtually uncontrolled for one week, until soaked by rains. This fire is significant from a historical standpoint, as an example of what can happen without constant, intelligent intensive woodlands fire prevention and protection, such as exists today. In 1956, an organized forest management program was initiated with responsibilities for both protection and management of the installation's forest resources. A summary of wildland fire is presented in Section 2.8.

Military Use

The past military history and present mission of the post are described in Section 2.1.3 and Section 2.1.4 of this document, respectively. Wildfires have been the greatest single impact of military land use on the installation's forest resource. The posting of the AIA removed some timberland from the management base. The AIA, which had been cutover or put into crop production before military occupation, occupies some of the poorest soils on the installation and has changed little since its establishment in 1941. The only major change was an addition in the early 1980s of several hundred acres along its northern border. This was done to accommodate a larger safety zone required by the U.S. Air Force for aerial firing. The present configuration of small arms ranges in

the SAIA has changed little since its establishment during WW II. In addition to the frequent fire history, metal contamination of standing timber occurred. This practice continued through the Korean and Vietnam actions, with occasional removal of contaminated timber permitted during fluctuations in range use. In the early 1970s, timber harvesting removed a large portion of the metal contaminated timber from the SAIA. The construction of earthen berms downrange of the most actively used ranges took place in the late 1970s. These berms have effectively minimized metal contamination outside of the range itself. Areas not protected in this manner are of the poorest site quality, and berm construction is not cost effective. Past military use of the installation's woodlands has not had a particularly adverse impact on the resource, although occasionally conflicts between harvesting and training use have occurred. The present installation mission is very compatible with forest management. Signal Corps field training is quite site specific, permitting virtually unrestricted forest management activities throughout the installation.

Reforestation

The first attempts at reforestation were made in the early 1950s, using offenders from the U.S. Military Police disciplinary barracks under civilian supervision. The results of these hand plantings varied from poor to excellent and consisted of reforestation of old fields and other open areas. During the 1950s and 1960s, many Federal and state forestry agencies were advocating the use of slash pine as the species of choice for southern reforestation efforts. Consequently, many of the plantations established on the installation during this period were slash pine. The use of slash pine continued until the early 1970s when the use of loblolly pine began. Direct seeding of longleaf pine was tried in FY 1959. It proved to be unreliable in the establishment of new stands and all efforts in direct seeding ceased. Direct seeding was tried on some 3,300 acres with little to no success. Because of their massive root system, the planting of bare-root longleaf pine seedlings was difficult and very unreliable. Therefore, little time or effort was spent on planting longleaf until recently. Recent interest in reestablishing native species and subsequent developments in pine nursery operations has renewed the interest in planting longleaf. Installation efforts within the last few years have proven fruitful in reestablishing longleaf on sites were it no longer existed. Reforestation by the means of seedtree cuts has been tried on several 1,000 acres during the past with little or no success. Artificial reforestation by means of planting has proven to be the most reliable and effective way to establish pine seedlings on the dry sandy soils found on the installation.

4.5.3.3 Forest Products Market

The Augusta area has historically had a strong local demand for wood fiber, chip-n-saw, and sawtimber. The future market forecast for pine pulpwood in the area is unclear at this time while demand for hardwood pulpwood, pine chip-n-saw, and pine saw logs is expected to remain strong. The demand in the local area for pine pulpwood has steadily declined since the conversion by the local paperboard mill to the use of approximately 80 percent hardwood pulpwood and 20 percent pine. International Paper Company (International) recently purchased the mill, which is one of the largest paperboard mills in the country. The mill is located in Richmond County, about 12 miles from the installation. This mill was built in the early 1960s, and has been the primary outlet for pulpwood from Fort Gordon ever since. International also has a chipping head rig and sawmill, enabling them to provide a multiple product outlet for area forest products. All sawmills in this area have facilities for chipping slabs and edgings into pulpwood, and all area pulp mills accept direct chip input. International operates several chipping mills in the area for processing hardwood chips. Pine pulpwood operations in the area have changed over the last 15 to 20 years from short wood to tree length operations. Such utilization changes have influenced the market in this area. Short wood is being replaced by tree length wood that is used for chipping and saw wood. In addition, low grade hardwoods, which were previously non-merchantable, are increasing in demand for pulpwood operations. The loss of harvesting by short wood methods has severely reduced the feasibility of selectively thinning pulpwood stands.

Pinestraw is a forest product, which began to gain significant economic value about 20 years ago. Although the demand for pinestraw is expected to remain strong, prices received for pinestraw sales vary significantly from year to year because of outside market conditions. The USACE Savannah District maintains a mailing list of potential bidders for each sale, which includes user mills and their dealers, as well as independent producers.

4.5.3.4 Total Estimated Timber Volumes

The total estimated timber volumes on Fort Gordon are presented in Table 4-15. These estimates are based on the 1994 RCW foraging/habitat analysis/forest inventory and the 2004 forest inventory. The total volumes in Table 4-13 are a summation of the computed volumes by stand and as such do not have a sound statistical basis. A more current collection of forest stand data

(2004 Forest Stand Inventory) was collected from 2000 – 2006, but because of software issues the computation of statistical totals for volumes and other stand data is still being worked on at this time. Some of the data, such as new stand boundaries and forest types, are usable and have been used to update other databases and map layers. The recent implementation and use of the RCW Matrix has resulted in the need for forest stand data than has not been collected in previous inventories. A decision was made in 2006 to proceed with the next 10 year forest stand inventory after all data requirements were identified and once an adequate data collection and processing software package was obtained. Since late 2006 the installation has been working with Fort Jackson and Landmark Systems to develop an inventory processor that will allow South Carolina Forestry to collect stand data, produce usable output, and provide data in formats ready for import into geo-databases. This inventory should have begun in late 2007 or early 2008 and will be completed in yearly increments with a planned completion date of no later than 2014, which will meet the requirement to complete a forest inventory every 10 years. In 2006, the Environmental Programs Office, Assistant Chief of Staff for Installation Management issued the U.S. Army Forest Inventory Guidance. The use of this guidance for forest inventories is not mandatory but is intended as a guide only. As such, Forestry Staff will use it as it was intended as a guide as they prepare and conduct forest stand and tree data inventories on the installation.

Table 4-15. Estimated Timber Volumes on Fort Gordon Based on the 1994 and 2004 Forest Inventories

Timber Type	Volume
Pine Sawtimber	525,000 MBF
Hardwood Sawtimber	91,000 MBF
Pine Pulpwood	2,500,000 cords
Hardwood Pulpwood	725,000 cords

Fort Gordon, 2008c
MBF= Thousand Board Feet

4.5.3.5 Annual Harvest by Product

Standing timber

Until completion of individual stand prescriptions, only an informed estimate can be made of projected annual harvest. In the interim, an annual harvest of 1 million to 1.5 million board feet of pine sawtimber and between 1,000 and 2,000 cords of pine pulpwood should be sustainable. There will be an increase in pulpwood as

planted stands become of a merchantable size. There will be an increase in volume of small sawlogs produced, and a decline in large sawlogs as older under-stocked and/or off-site stands are liquidated and replaced with new stands, mostly by planting. The volume of hardwood pulpwood to be harvested should continue to increase slightly. Most of the hardwood pulpwood harvested will come from areas where the pine stands are being liquidated. Due to the harvest of hardwood sawtimber adjacent to Brier Creek resulting from beaver damage during FYs 1981 through 1983, and increased restrictions on mechanical harvesting in wetlands no harvesting can be sustained there for the foreseeable future.

Pinestraw

No attempt has been made to determine the volume of pinestraw harvested in any year; rather, pinestraw is sold on an area basis. Therefore, no projected annual harvest by volume can be made.

4.5.3.6 Harvest Cycles

Standing timber

Current and future timber harvest will be timed based on several factors, which include but are not limited to stocking levels, growth rates, military training needs, construction, and to meet the requirements of other plan objectives such as threatened and endangered species requirements and invasive species management. At the completion of the stand prescriptions, each unit will be reviewed for harvest requirements at least once every 10 years. A projected schedule of timber harvest areas is presented in Appendix S. This schedule shows those areas planned for harvest because of current known requirements such RCW habitat improvement needs and military construction projects. The areas shown are subject to rescheduling if the requirements change in the future. In addition, other areas will be added to the schedule as new requirements or needs become known.

Pinestraw

Pinestraw harvesting will not be scheduled in any one management unit more than twice during any 6-year period. Straw markets and installation access by contractors as well as other activities such as prescribed burning, timber harvest, and military training has an impact on the harvesting of pine straw so scheduling is tentative at best. A tentative schedule of pinestraw harvest is presented in Appendix S. The management units listed are those in which pinestraw has been harvested in the past. Management units not currently included may be added to the schedule as stands within them become suitable for pinestraw harvesting.

4.5.3.7 Estimated Operating Cost by Fiscal Years 2009 through 2013

Estimated operating costs for the plan period are presented in Appendix S. The estimated costs are presented by forest management activity and total for the appropriate FY.

4.5.3.8 Estimated Value of Harvested Products FYs 2009 through 2013

The estimated value of forest products harvested on Fort Gordon is presented in Appendix S.

4.5.4 Description of Forest Types and Forestland Classification

4.5.4.1 Description of Forest Types and Tree Species

Most of the tree and shrub species common to the Fort Gordon installation may be grouped into eight major forest types adaptable to the existing forest conditions and management requirements. They are Natural Pine, Pine Plantation, Pine-Scrub Oak, Pine-Hardwood, Scrub Oak, Upland Hardwood, Bottomland Hardwood, and Hardwood-Pine (Figure 4-10).

<u>Natural Pine</u>

Longleaf pine and loblolly pine make up this type. Shortleaf pine and pond pine *(P. serotina)* occur naturally on the installation usually in conjunction with loblolly pine stands and do not exist in pure stands of any consequence. This forest type includes all natural pine stands, regardless of species, in which less than 20 percent of the overstory BA is hardwood or less than 20 percent of the overall stand BA is dominated by scrub oak. A further breakdown into sub-types can be made according to pine species and mixtures, which normally vary, with the topography and soil on the installation. Longleaf pine historically was the predominant species that grew naturally on the dry, deep, sandy soils of the Sand Hills region. It occurs in pure stands on the sand ridges and upper slopes becoming mixed with loblolly pine on the lower slopes and wetland margins. Loblolly pine grows naturally on the clay type soils of the piedmont region and on wet soils associated with wetlands. It occurs in pure stands on the installation on the upper and lower slopes where clayey soils exist and on wetland soils associated with drainages becoming mixed with longleaf on the dryer slopes and ridges in the absence of fire. Loblolly pine exists in pure stands on sites that historically would have been longleaf sites because of past human activities both before and after U.S. Army ownership.

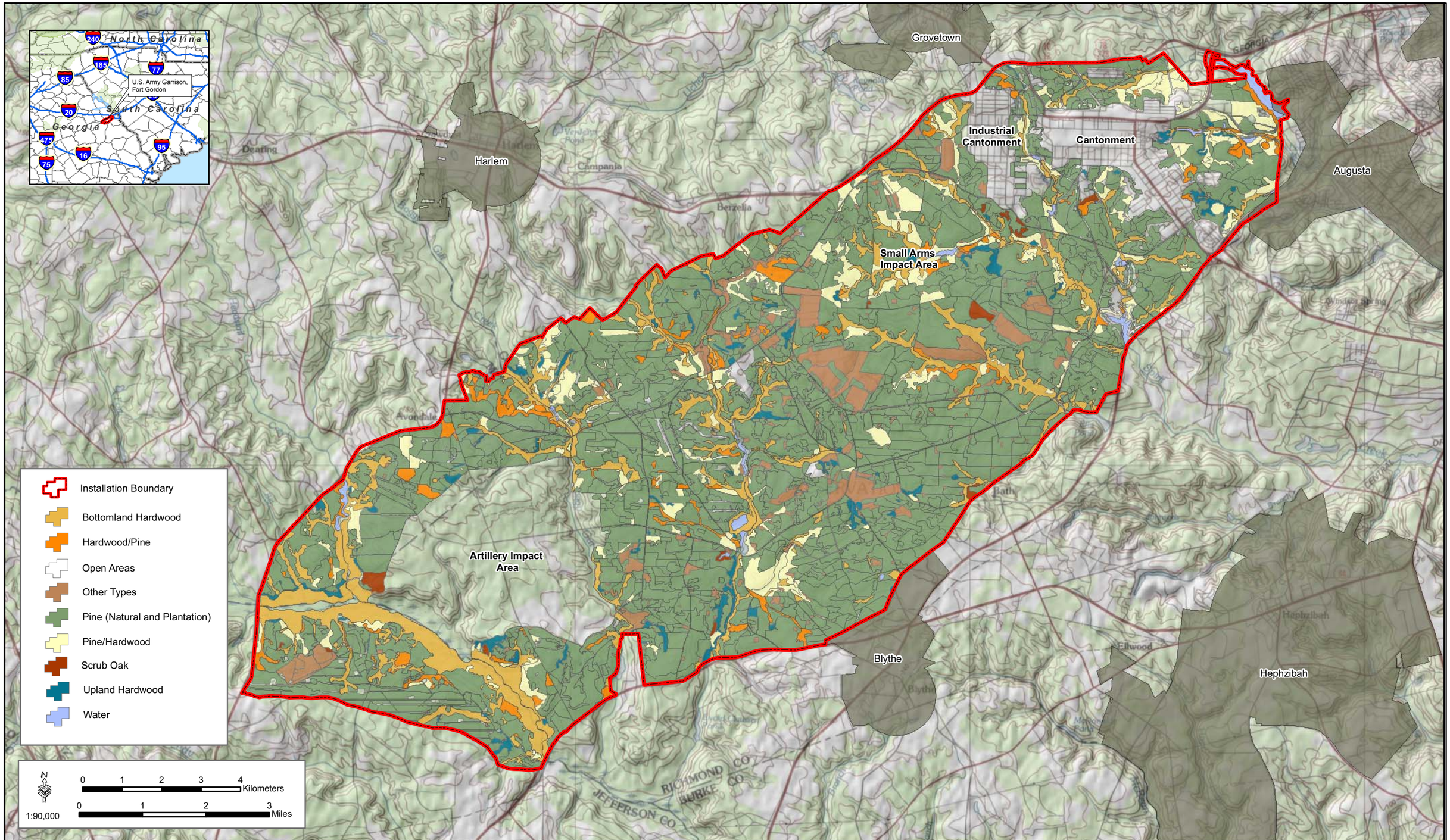

Figure 4-10: Forest Types on Fort Gordon

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Pine Plantation

This type is made up mostly of planted loblolly pine and slash pine. The slash pine is not native to Fort Gordon. Some planted longleaf pine and direct-seeded longleaf pine are scattered throughout the installation. The area of longleaf pine plantations will increase as areas are restored to longleaf pine from non-native slash pine and off-site loblolly pine. There are also several small plantations of sand pine *(Pinus clausa)* and Virginia pine on the installation. Neither of these species is native to the installation.

Pine-Scrub Oak

This type is made up of pine with a scrub oak understory that may revert to scrub oak without proper management. Longleaf pine is typically the pine species associated with this type but other pine species may also be present. The area must have greater than 30 percent pine BA but less than 60 percent pine BA. This type is usually located on sand ridges and upper slopes where sandy soil is relatively deep.

Pine-Hardwood

The hardwoods in this type must constitute 21 percent to 49 percent of the overstory BA, the remainder of the overstory being pine of any species. This type can be divided into two sub-types according to site. Longleaf, loblolly, and/or shortleaf pine are commonly found mixed with upland hardwoods on the upper and lower slopes and loblolly and/or pond pine with bottomland hardwoods on the lower slopes and bottomland sites.

Scrub Oak

A minimum of 51 percent of the BA must be dominated by scrub oak to be classed as this type; the remaining BA is usually composed of scattered longleaf pine of less than 30 ft^2/ac BA. Scrub oak species include turkey oak, laurel oak (*Querus hemisphaerica)*, blackjack oak, sand post oak *(Quercus stellata* var *margaretta),* and bluejack oak. Small black gum, persimmon *(Diospyros virginiana),* sand hickory *(Carya pallida),* pignut hickory *(Carya glabra),* and mockernut hickory *(Carya tomentosa)* are often mixed with the above species on the sand ridges and upper slopes.

Upland Hardwood

At least 80 percent of the BA of the overstory trees in this type must be upland hardwoods. The remaining percent may be pine of any species. Upland hardwood species include southern red oak, water oak, northern red oak *(Quercus rubra),* willow oak, white oak,

sweetgum, and post oak. Also, found in association with upland hardwoods are persimmon, pignut hickory, and mockernut hickory of better quality than those found in association with scrub oaks. Upland hardwoods are usually located on lower slopes and around old home sites.

Bottomland Hardwood

This type requires a minimum of 80 percent of the BA of overstory trees to be bottomland hardwoods; the remainder can be pine of any species. Bottomland hardwoods consist primarily of black gum and red maple, with scattered sweetgum, water oak, sycamore, and yellow-poplar, located in branchheads, swamps and poorly drained soils bordering streams.

Hardwood-Pine

The hardwoods in this type must constitute greater than 50 percent of the BA but less than 80 percent of the BA, the remainder being pine of any species. The main difference between this type and upland hardwood is the presence of an adequate number of seed producing pine trees for the regeneration of the area to pine.

Other Species

Some of the other species commonly found in mixture with the above types are: swamp bay *(Persea pubescens),* flowering dogwood, black cherry *(Prunus serotina),* American holly *(Ilex opaca),* river birch, black willow, hackberry, American beech, swamp chestnut oak, eastern red cedar *(Juniperus viriginicus),* and ironwood *(Ostrya virginiana)*.

4.5.4.2 Forestland Classification

U.S. Army regulations currently specify two forestland classifications: reimbursable (commercial) and non-reimbursable (noncommercial) forestland. Reimbursable forestland (RFL) is described as land that is capable of economically producing crops of industrial wood in excess of 20 cubic feet per acre per year under management and is not programmed for another use that would preclude future forest development. The direct bullet impact area of all small arms ranges, the AIA, and the known Dud areas in TA 20, on North Carter Road, and in TA 49 have been withdrawn from the RFL category in the current inventory, and are included under the non-reimbursable forest (NRFL) land acreage (Figure 4-11). Earthen berms have been constructed downrange of selected small arms ranges. Essentially all of the area known as the SAIA is

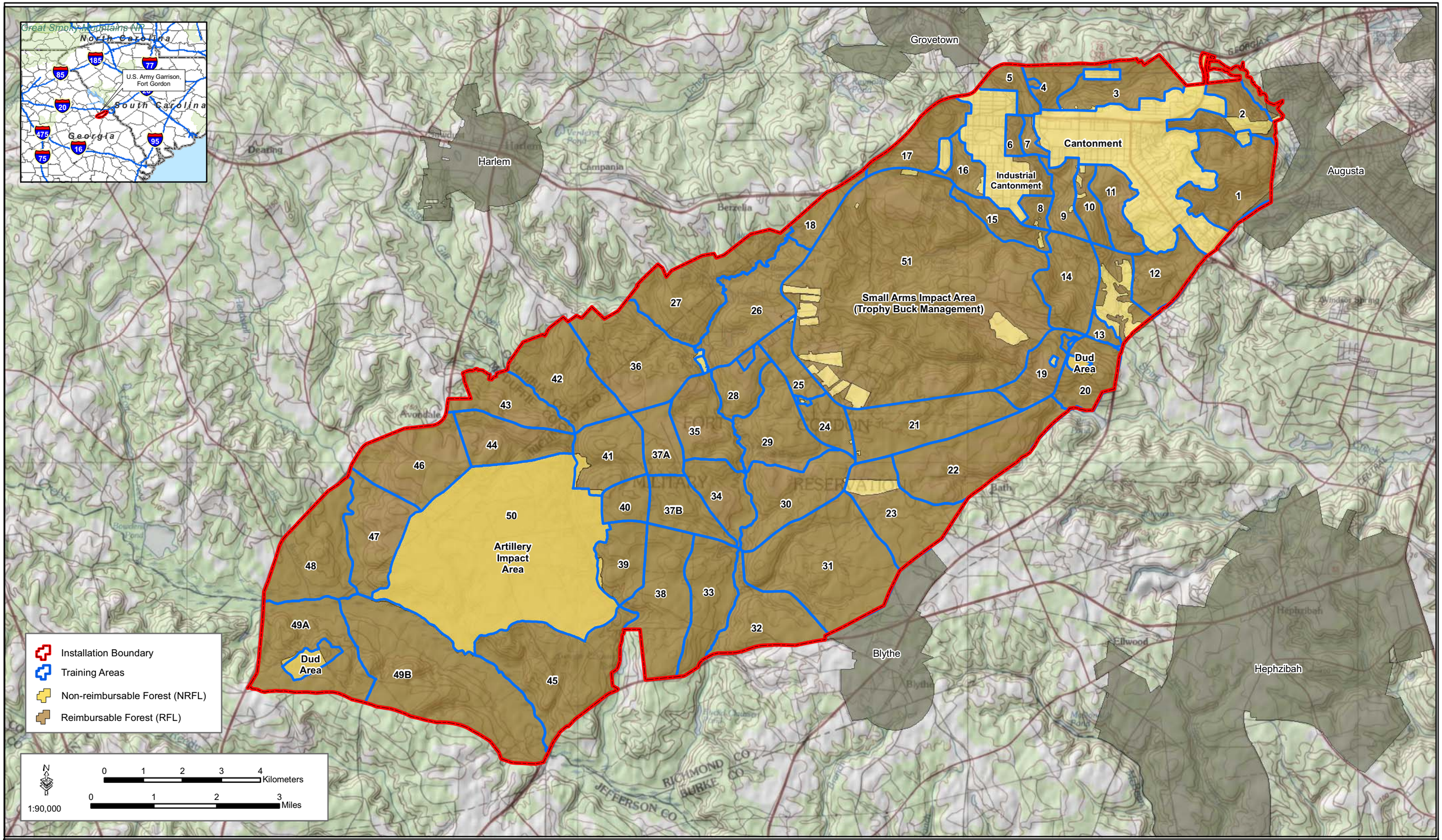

Figure 4-11: Reimbursable Forestland (RFL) and Non-reimbursable Forestland (NRFL) on Fort Gordon

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located within the safety fans of one or more ranges and access is restricted while small arms range firing is in progress.

The acreage of Fort Gordon lands by Forestland Classification are presented in Table 4-16. All RFL is presently available for management with minimum restrictions. The amount of acreage with stringent restrictions on the types of forest management activities carried out on it is subject to significant increases during the period covered by this plan. These restrictions could result from increased emphasis on such things as ground cover; endangered species; community tier levels; Federal and state laws and regulations; and DoD and U.S. Army regulations and guidance.

Current Federal law and DoD/U.S. Army policy prohibits the use of reimbursable forestry funds for activities that cannot reasonably be expected to produce forest revenues or in areas that are classed as NRFL. An increase in NRFL acres will increase the need for other funds to cover forest ecosystem management and protection activities, which historically have been paid for with reimbursable forestry funds. The availability of current NRFL for forest management is not foreseeable at this time.

Table 4-16. Acreage of Fort Gordon Lands by Forestland Classification.

Forestland Classification	Area (acres)
Reimbursable	45,492.0
Non-reimbursable	10,095.5
Total Installation	55,587.5

Source: Fort Gordon, 2008c

4.5.5 Management

4.5.5.1 General

An intensive forest management program is currently being conducted on the installation. It is the intention of the forestry program to maintain, restore, and manage the installation's forestlands on an ecosystem basis. The harvesting of forest products is allowed and encouraged when conducted consistent with protecting and maintaining a viable, self-sustaining forest ecosystem. All forestry prescriptions will restore, maintain, and improve the ecological functions and values of the particular forest unit being managed. Foresters will work with military trainers through the ITAM program to ensure that future forest conditions are compatible with military training. Timber management in the RCW HMU will be done under the silvicultural guidelines of the

revised 2003 RCW Recovery Plan, the 2007 Management Guidelines for managing RCW on Army installations, the Fort Gordon RCW ESMC, and 4-3 of AR 200-1. Where not otherwise restricted, soil types and capabilities will determine which tree species will be grown. The primary products will be pine sawtimber, chip-n-saw, and pulpwood. Pine veneer and poles are functions of quality, and occurrence is not such that pole or veneer log sales can be anticipated or scheduled. The presence of these products in a given sale area enhances the stumpage price, as producers segregate and merchandise these products separately. Hardwood sawtimber and pulpwood will be managed in appropriate areas. The majority of reimbursable hardwoods growing on Fort Gordon are bottomland species, with some occurring in appropriate microenvironments along lower slopes and in small stream hydric zones. As a general policy, plans are to grow each species in its naturally appropriate area, such as pine on pine sites, and hardwoods on hardwood sites. Normally, manageable reimbursable species growing in appropriate areas will not be eliminated and converted to other cover types. Longleaf pine stands where feasible will be managed for pinestraw production.

4.5.5.2 Primary Forest Tree Species for Management

Longleaf and loblolly pines, which are both native to the installation, will be the primary forest tree species that will be emphasized in management since the majority of the forestland soils support one or both of these two species. Other native forest communities, such as bottomland hardwood, will be grown and managed in areas to which they are adapted. During the 1950s and early 1960s, the majority of pines planted were slash pine because of this species' rapid growth and its ready availability from state nurseries. Fort Gordon is located outside of the natural range of slash pine, in addition to poor growth on the dry sandy soils that occur on the installation, individuals planted here are susceptible to severe ice damage and a high incidence of fusiform canker. Plans are to eliminate them by attrition and replace them with either longleaf or loblolly pine. Longleaf and loblolly pine will be the two preferred pine species for forest management. Soil types and site conditions will determine which of the two preferred species will be used.

4.5.5.3 Rotation Ages

The rotation ages set forth below are minimums. No absolute rotation is established. Variables involving the military mission, endangered species, and other considerations may preclude absolute projection of final harvest.

- Longleaf Pine - The minimum rotation for this species is 120 years. Longer rotations for longleaf pine are preferable for RCW management. Older longleaf pine is more susceptible to red heart disease which is preferable to the RCW for cavity excavation.
- Loblolly and Other Native Pine - The rotation age for these species is 100 years with the following exceptions: off-site stands that are to be converted, poorly stocked stands, or stands heavily infested with insects or disease.
- Slash Pine and Other Non-native Pine - No rotation age has been set for slash, sand, and Virginia pines. These species are not native to the installation. Slash, sand, and Virginia pine stands will be harvested and the sites converted to native species as feasible.
- Hardwoods - No rotation age is set for the hardwood as these stands are being primarily managed for long-term wildlife management, wetland benefits, erosion control, aesthetics, and vegetation diversity.
- RCW Cluster Stands - Pines in active RCW clusters and recruitment clusters will have no rotation age set in accordance with the 2007 Guidelines for Managing RCW on Army installations.

4.5.5.4 Cutting Cycle

Because of extreme variations in site condition and productivity at this installation, no firm cutting cycle is established. Following the first reimbursable thinning of a pine pulpwood stand at age 15 to 30 years, the stand will be examined approximately 5 years later and a second cut scheduled if indicated. Following this second cut, a 10-year interval can be anticipated before any further cutting is considered. No cycle is established for bottomland hardwood. Beaver population buildup in most stream systems imposes an unknown variable on future regulation of bottomland hardwood cutting. Beaver control measures where viable will be coordinated with the DPWL wildlife biologist and done in accordance with the beaver control SOPs (see Section 4.9). Major harvesting of bottomland hardwood was accomplished in Brier and Headstall Creeks in 1967, as an improvement cut. Surveys during FY 81 revealed an inordinate amount of beaver damage to residual high quality, large diameter stems. The decision was made to market as much as possible within 2 years to preclude loss of this resource. Harvesting in these drainages was completed in 1983. No cycle is established for upland hardwood, due to limited stand integrity. Desirable upland hardwoods generally will be retained to biological

maturity as wildlife habitat, rather than being cultured solely for timber resources.

4.5.5.5 Management Units and Stands

Rather than arbitrarily harvesting in a specific compartment according to a particular year, which has proven unworkable in the past, all future management will be tied to a stand management concept. The reimbursable forest area of the installation has been divided into 51 management units, which match the areas used for training and other natural resources management (see Figure 2-1). Two areas that are not numbered have been assigned numbers as follows: the entire SAIA has been designated as Unit 51 and the AIA has been designated as Unit 50. These management units are an administrative expediency for record management, facilitation of stand locations, fire control, and related woodland activities. Within this framework, management will relate to the individual stands, which comprise the forest. Each stand within a management unit is assigned a stand number when inventoried. At this time, there are approximately 1,900 individual stands included in management records and planning. This system is described further in ensuing paragraphs.

<u>Management Units</u>

The timber management units match training areas to facilitate scheduling and work assignments between all activities involved in natural resources management and military training activities. The boundaries of the management units are as shown on the March 2007 edition of the Fort Gordon Special (installation map) produced by the Fort Gordon ITAM/Range Control GIS Department (see Figure 2-1).

<u>Stands</u>

The stand is the basic and governing management entity, for it is the stands, which comprise the forest resource under management. Stands are subject to change in size, classification, and composition, due to changing military land use, fire, insect, storm depredation, and/or management decisions. This concept of stands within management units provides the manager with resources and records control that are positively identifiable, but flexible enough to permit changes over time.

<u>Management Unit and Stand Numbers</u>

Stands will be identified within each management unit, and will be designated “Stand 1” through “Stand n,” commencing with Stand 1 in each unit. All management references will be by Management

Unit and Stand Number, for location purposes (for example: Management Unit 22, Stand 3 or 22003).

4.5.5.6 Forest Management Information System (FMIS)

Information on each stand will be maintained in an electronic database such as Microsoft Access or some similar type software program. This database will be used to enter, store, manipulate, retrieve, and generate reports on all data pertaining to stand management. This is in effect a sequential filing system. All forest stands will be inventoried during the current on-going forest stand inventory and the data will be stored in this file. This database will be used to assist in stand prescriptions, harvest planning, and other forest management activities and will be maintained in such a manner so that it can be geo-referenced by stand from within the GIS. This database will be linked through a unique, primary key to SDSIFE-compliant forest stands feature class.

4.5.5.7 Stand Prescriptions

As the current forest stand inventory is completed for each management unit, stand data will be reviewed and prescriptions written for each stand. These prescriptions will layout the future management objective of each stand and the silvicultural treatments required to reach that objective. A schedule of silvicultural treatments required during the next 5 to 10 years will be included. All stand prescriptions will be made considering military training requirements and all aspects of the INRMP and the goals and objectives thereof. Stand prescriptions for each management unit will be given to other natural resources personnel and range control for review and comments. All valid comments and recommendations will be addressed and changes made as necessary before any treatment action begins. Stand prescriptions will be entered into a stand prescription database which will be linked to GIS. The prescription database will be maintained electronically, but samples of hardcopy reports are shown in the Appendix S. The current objective is to complete these prescriptions as compartments are inventoried. It is anticipated that 4,000 to 5,000 acres per year will be inventoried and have prescriptions completed. If this scheduled is followed then all areas will have prescriptions completed by 2014 when the current forest stand inventory is scheduled to be completed.

4.5.6 Silvicultural Practices

The forest resource at Fort Gordon is evolving from a patchwork of residual stands and scattered stems to a resemblance of a regulated forest. Changes have occurred over time because of

military land use and opportunistic silvicultural practices. No regulated annual harvest or smooth cash flow has been attained. Intensive fire protection has been emphasized since 1957 and pine density levels have increased many fold since U.S. Army acquisition of the property. Current and future management emphasis will be on establishing and maintaining native pine ecosystems. All silvicultural practices in the RCW HMU will be carried out in accordance with the revised 2003 RCW Recovery Plan silvicultural guidelines. A priority will be given to bringing stands in the RCW HMU to within the revised 2003 RCW Recovery Plan guidelines. With the goal being to establish and manage as many acres as is reasonably possible of healthy forested ecosystems that support the military mission, endangered and threatened species, and a regulated annual harvest on a sustained yield basis.

4.5.6.1 General Silvicultural Practices

A combination of even-aged and uneven-aged management systems will be used. The even-aged system provides the most cost-effective means of management; the only viable method to restore longleaf pine to many of its original sites; and is compatible with military training; and other military land uses. However, the long-term goal is to e*stablish and sustain a balanced age class distribution throughout the forest (e.g.*, an uneven-aged forest.) Bottomland hardwood management will be dictated by the extent and spread rate of beaver encroachment. Previous bottomland management goals had been to grow the trees to a large size and approximately 60 years of age, maintaining only the highest quality stems in a mixed age forest. It now appears that as beavers spread, management will focus on conducting salvage harvest to minimize loss of the resource. During the course of bottomland timber disposal, all merchantable pines growing in the bottomland hardwood environment will be removed, and any hardwood encroaching upon good pine sites will be harvested. Upland hardwood management is virtually nonexistent. Upland hardwoods of good quality and merchantable size occur primarily as scattered individual stems, and for the most part are valuable sources of wildlife food. Where coherent stands of good upland hardwood exist, these will be encouraged and protected for both wildlife value and vegetation diversity.

4.5.6.2 Intermediate Cuttings

Stand management will attempt to retain optimum stocking per acre for maximum benefit over the life of the stand. This is a function of site quality, initial stocking, and stand condition. The current on-

going forest stand inventory and prescriptions will provide information upon which to make management decisions for each of the stands. The major guideline is to selectively mark stands to a BA of 60 to 70 ft^2/ac, removing unhealthy trees and trees of inferior quality on a 10 year cutting cycle. In the RCW HMU the thinning guideline for stands will be to leave a BA of 40 ft^2/ac of pines with at least a 10 inch DBH and return for additional thinning when the basal area increases to greater than 70 ft^2/ac.

4.5.6.3 Final Harvest Cut

The final harvest cut of fully stocked stands will be scheduled when stands reach rotation age. Stands of non-native or off-site species and those stands which are under stocked, poorly formed, or excessively diseased, will be scheduled for final harvest as soon as feasible.

4.5.6.4 Silvicultural System

A silvicultural system is a comprehensive, planned program of treatments and methods applied throughout the life of a forest stand. Fort Gordon forest managers presently use two systems with three variations.

<u>Even-aged Silvicultural Systems</u>

- *Even-aged stand*. An even-aged stand is one in which relatively small age differences exist between individual trees. The maximum difference in age permitted in an even-aged stand is usually no more than 10 years. Although, where the stand will not be harvested until it is 100 to 200 years old, larger differences up to 20 percent of the rotation age may be allowed. An even canopy marks even-aged stands. The smallest trees of the stand are normally those of the same age class, which have been suppressed by their contemporaries. The majority of stems are in a diameter class, which represents the stand average, and there are fewer trees in classes above and below the average.
- *Natural even-aged silvicultural system*. This is a system widely used on U.S. Army lands in the southeastern U.S. and is most useful in blending military training with sustained yield of multiple resources. The system may be described as forest management composed of even-aged stands originating from a seed source, thinned at periodic intervals for stand improvement, maintained by fire, and regenerated from the residual stand at rotation age. Advantages are that establishment and maintenance are relatively cheap,

undesirable trees are removed at a profit, and regeneration is from a known source of high quality trees. Mature forests with an open understory are highly conducive to many kinds of military training.

- *Artificial even-aged silvicultural system*. The system is simple and is not labor intensive. Stands are clear-cut, intensively site-prepared, planted with seedlings, periodically thinned, grown to rotation age, harvested, and regenerated. Productivity and economic return are at an optimum balance. The system does have several disadvantages such as, extreme military damage to the plantation can occur very rapidly, no seed source to regenerate openings; there is a high cost of establishment; and plantations may lack biodiversity. Plant and animal species dependent upon old-growth trees normally do not do well in such an intensive, short-rotation silvicultural system. This system has application on sites where conversion from nonnative or off-site species is required and an inadequate seed source is present. Where type conversion is necessary, this silvicultural system is the most logical solution. Once the stand has been established, plantation management will be phased into the natural even-aged or uneven-aged silvicultural systems.
- *Pine plantation*. A pine plantation is a stand, which has been planted with seedlings obtained from a nursery, rather than originating from seed sources on the site.

<u>Uneven-aged Silvicultural Systems</u>

- *Uneven-aged stand*. Uneven-aged stands are those in which there are considerable differences in age of trees and in which three or more age classes are represented. The canopy is normally broken and uneven. Uneven-aged stands have a larger percentage of stems in the smallest diameter class with stem numbers decreasing somewhat regularly as diameter size increases.
- *Uneven-aged silvicultural system*. Uneven-aged management is a system, which attempts to produce a forest of uneven-aged stands. The advantages of the system are: periodic and flexible income is provided without interruption for stand regulation; the stand is upgraded if fast-growing, high quality trees are left to regenerate the stand; the stand is not as vulnerable to destruction by fire, biotic, climatic, or military agents; the stand is more aesthetically pleasing and provides more varied habitat for wildlife. The disadvantages

of the system are: more management skill and time is needed than with other reproduction methods; some management practices such as prescribed fire and chemical treatments are difficult to apply; more care is required to prevent damage to the stand during logging; and higher road maintenance costs are necessary because of frequent harvests required to provide openings for regeneration. Uneven-aged management is difficult to apply to Fort Gordon forests because of the shade intolerance of slash and longleaf pines, the history of relatively infrequent prescribed burning and the resulting vegetative competition. Frequently, regeneration has not come in because harvests have not sufficiently opened the residual canopies.

4.5.6.5 Intermediate Harvests

Harvesting or cutting of timber within silvicultural systems is called intermediate cutting. Intermediate cuts are made between stand establishment and rotation age when the stand is liquidated. Intermediate harvests are of three types: thinning, improvement cut, and salvage-sanitation cut.

Thinning

A thinning is a harvest to reduce competition and accelerate growth of the residual stems. Commercial thinning is made in stands where revenue is derived from the sale of the thinned trees. Hand crews, prescribed fire, chemicals, or mechanical means are methods used to accomplish thinning in precommercial stands.

Improvement cuts

This is a harvest method in mixed stands of desirable and undesirable trees. Undesirable trees are removed to improve quality, to remove vulnerable trees before disease and insect infestation, to improve wildlife habitat or aesthetics, and to open-up stands to increase military maneuverability. Improvement cutting is the major type of harvest used at Fort Gordon.

Salvage-sanitation cuts

This harvest salvages timber damaged by fire, military training, insects, storms, or other catastrophic forces. Minimization of economic loss, utilization of damaged timber and aesthetic improvement are the objectives rather than to generate income.

4.5.6.6 Regeneration

Regeneration of forest stands is the most difficult phase of silviculture. Species, site capability, weather, competing vegetation, and availability of an acceptable seed source are some of the variables that must be considered when the forest manager plans to regenerate a stand. In natural management, the forest manager often has little control over these variables, but must exert subtle influences through intermediate silvicultural treatments over many years to bring a stand to the point where satisfactory natural regeneration will be possible.

Even-aged regeneration harvests

These are harvests planned specifically to bring about regeneration and not to improve the stand or generate income. Characteristics of individual species such as shade tolerance, susceptibility to wind-throw, soil and moisture requirements, and seed dispersal ability are factors, which determine the type of regeneration harvest to be applied within a silvicultural system. Even-aged regeneration harvests may be one of the following: clear-cut, seed tree, or shelterwood.

- *Clear-cut*. Clear-cutting is the harvesting of all merchantable trees in a stand in one operation. Generally, clear-cut areas will not exceed an average of 80 acres in any one block. Clear-cuts within 1 mile of active or recruitment RCW clusters will not exceed 40 acres in size. Regeneration will be accomplished either naturally or artificially. Hardwood stands, which have been clear-cut, generally reproduce from stump and root sprouts or seeds stored in the forest floor. Pine stands are most often regenerated artificially by planting. Site preparation may be necessary in the form of drum chopping, raking, windrowing/piling, burning, disking, bedding, chemical application, or a combination of these treatments.
- *Seed tree*. This method selects high quality, prolific seeding trees to be retained to provide a seed source following harvest of the rest of the stand. Ten to 15 evenly spaced dominant or co-dominant loblolly pines per acre are left as a seed source. They are marked at breast high and marking will be visible from 360 degrees. Butt marks will be placed at ground line on the stump with liberal amounts of paint. After a stand of young trees is established, seed trees will be removed. The method is well suited to loblolly pine, but does not provide enough seed to be used with longleaf pine. Seedbed preparation such as chopping, and/or burning is

usually sufficient to expose adequate mineral soil. Disking or chemicals may be necessary on sites having heavy hardwood understory or a deep root mat.

- *Shelterwood*. This method is used on heavy seeded species such as longleaf pine, oaks, and hickories where seed dispersal from seed trees is not sufficient to provide for complete coverage of the stand. A series of preparation cuts may be necessary to remove unhealthy and defective trees and undesirable species, and to prepare the seedbed and encourage seed production. Over a period of years, shelterwood cuts will improve the vigor and productivity of remaining trees. The regeneration cut leaves 30 to 40, evenly spaced trees per acre, of the best dominant and co-dominant trees in the stand. As with the seedtree method, as soon as an adequate seedling crop is established, the overstory should be harvested.

<u>Uneven-aged regeneration harvests</u>

Uneven-aged regeneration harvests (sometimes referred to as modified shelterwood harvests) are usually done at intervals of 5 to 10 years, and every harvest has an objective to provide an opening for regeneration and to maintain an uneven-aged stand. Trees are designated for removal by the selection method either as single trees, small groups, or a combination of both. The selection method involves periodic cutting of selected trees from all merchantable classes. In stands having 60 to 70 or more ft^2/ac of merchantable BA and two-thirds to three-fourths of the BA in sawtimber, harvest-cut volumes can approximate growth for the cutting period. Trees selected for harvest can be single isolated trees or groups of trees. If possible, the slow-growing and/or poor quality trees are cut and the best trees left so that stand quality and growth will be improved. Pine regeneration will come from seed produced by the best growing and best quality trees.

- *Modified Shelterwood*. This method is the same as the shelterwood system except not all overstory trees are removed after seedling establishment. Approximately ⅓ to ½ of overstory trees are marked for harvest using group selection of trees in patches, ranging approximately 0.25 to 2 acres in size distributed throughout the stand. Created openings will take advantage of existing openings with adequate reproduction by enlarging them if necessary. This method is particularly well suited for regenerating longleaf stands within the RCW HMU and for establishment of uneven-aged stands.

4.5.6.7 Conversion of Non-native and Off-site Stands

Fort Gordon will convert sites with non-native or off-site species to native species or species more suitable for a specific site. Slash, Virginia, and sand pine are the only non-native pines of any consequence growing on the installation. Of these slash pine is by far the most abundant as there is no more than 100 acres of Virginia and sand pine stands on the installation.

Loblolly pine stands make up the majority of the off-site pine stands that are growing on the installation. Some of these stands are plantations on sandy soils that may have historically had longleaf growing on them. Also there are some naturally seeded off-site loblolly stands that have become established as loblolly spread from stream margins and piedmont soils into surrounding areas that may have historically been longleaf. There also exists the possibility that there are some off-site longleaf stands growing on loblolly sites.

The area converted annually will be limited by several factors. Some of these limiting factors are the availability of funds and personnel, the number of acres needing conversion, the speed at which harvest contracts can be completed, and various other constraints. As prescriptions are prepared for each management unit, stands that require conversion will be designated as such so that they can be prioritized for conversion. These prioritizations for conversion will include all non-native and off-site stands within each compartment. Non-native and off-site stands that are required to meet minimum RCW habitat requirements will be designated as such, and will be maintained until such time as they are no longer required for RCW habitat. The stands that come under the "required for RCW habitat" designation will be managed in accordance with the revised 2003 RCW Recovery Plan silvicultural guidelines. In stands that are designated to be converted within the RCW HMU, all longleaf trees greater than 4 inches DBH will be left standing unless they need to be removed to maintain required BA levels, they are disease or insect infested, or they are of extremely poor quality. Several different silvicultural methods or combinations as listed above will be used in converting non-native or off-site stands to native species. One method will be to perform a final harvest on all or part of the stand and regenerate it to native species artificially. A second method will be to cut the stand back to a residual stocking of between 45 to 60 ft^2/ac basal area leaving the best trees and scheduling a final harvest some 5 to 10 years later. During this 5 to 10 year period, at least two prescribed burns will be scheduled and/or a chemical treatment will be applied to help control undesirable understory vegetation before the final

harvest. The third method would be to conduct a normal thinning and harvest schedule and schedule a final harvest in the third cutting cycle.

4.5.6.8 Forest Product Harvest Operations

Annual cut

An annual harvest is sustainable and anticipated. Until the forest stand inventory and stand prescriptions are completed and analyzed, a prescription of annual harvest volumes is speculative. Based upon inventory volumes, informed estimates and past performance, it appears that an annual harvest of 750,000 to 1 million board feet and 1,000 to 2,500 cords of pulpwood can be sustained.

Order of cutting

The order of cutting will be determined by the USACE Project Forester (Sales Officer). Normally, in combined product sales, pockets of pulpwood are identified and isolated at time of marking. These may be advertised and sold as a separate item on a larger combined sale, or advertised as a separate sale. The forest stand inventory and prescriptions will identify these stands before marking, which will facilitate sales planning. Sawtimber areas are normally harvested first in mixed sales, with scattered pulpwood and top wood harvested afterward for maximum utilization of the resource. Where the contract calls for an “All Pine Trees” option, tree length harvesting, skidding, and hauling are accomplished, with product merchandising done at the consumer mill yard.

Optimum volumes

No optimum volume per sale is prescribed. In combined product sales, the cords of pulpwood per one MBF of sawtimber ratio should not exceed one to one. This provides for maximum stumpage return.

4.5.6.9 Forest Product Sale Planning

Inoperable conditions

Areas that do not contain a minimum of 2 cords per acre or equivalent total will not be offered as harvest areas. All areas known to contain or which might contain military or other types of metal contamination, such as shrapnel or armor-piercing bullets, will be declared as known contaminated or possibly contaminated timber. Such areas will be identified on maps or aerial photographs and ground checked with District Engineer’s personnel before sales

advertising. Determination of excessive contamination may be made as harvesting progresses and stumpage price negotiated downward as needed. In extreme cases, portions of sale areas may be declared inoperable and deleted. Under no conditions, will there be any attempt to hide possible or known contaminated areas by including them, unidentified, with clean timber.

Range and Training Area Coordination

All proposed forest product sales in or in close proximity to any firing range or training area will be closely coordinated with the DPTMS, Range Control Section during the planning, solicitation, sale, and harvest phases of the operation. Military use has priority over timber harvesting; however, experience over the past 51 years has proven that with proper advanced coordination, both activities can proceed with minimum restrictions. Range firing may be shifted to other ranges, provisions made for alternate harvest areas during range firing, or if necessary, weekend harvesting can be scheduled. Except for site-specific training areas, there is normally no conflict between field training and timber harvesting. Occasionally, large-scale field training exercises (FTX) may take place. In such cases, it may be necessary to suspend harvesting in specific areas, or modify contractor ingress and egress for the duration of the FTX. The large area being closed during use of the current convoy live fire range has the potential to severely impact timber harvest along with other natural resources activities. This issue should be eliminated if the new convoy live fire range is built as planned in the SAIA in FY 2009.

Endangered Species

All areas of proposed timber sales will be surveyed for endangered species and any proposed timber sales in or in close proximity to any endangered species habitat will be closely coordinated with the installation wildlife biologist and the USFWS. These surveys will be conducted in accordance with procedures set forth for project surveys in the ESMC (see Section 4.1). All applicable endangered species-specific management guidelines and endangered species management components will be followed. The RCW Matrix will be used to insure that required RCW habitat is maintained in all active and recruitment RCW partitions. All harvesting activities will cease if any previously unknown endangered specie(s) is discovered in harvest area after harvesting has commenced. No management activity to include timber harvesting will knowingly be allowed to have a negative impact on endangered species or their habitat.

Cultural Resources

All phase one cultural surveys of the installation's unrestricted woodlands have been completed. Those sites that have been determined to be eligible or potentially eligible for the National Register of Historic Places (NRHP) will be avoided and no mechanical harvesting activities will take place within the site boundaries. Sites will be marked "Off Limits to Logging" and contractors will be shown locations of all sites to prevent accidental disturbance. If previously unknown sites are discovered during harvesting operations, all activities within the site will cease until a determination of National Register eligibility can be made. No management activity to include timber harvesting will knowingly be allowed to have a negative impact on cultural resource sites, which are eligible or potentially eligible for the NRHP.

Best Management Practices (BMPs)

All timber harvesting and timber management activities will be planned and carried out in accordance with Georgia's BMPs for Forestry, GFC publication, January 1999.

Other Harvesting Activities

Harvesting in recreation areas will be closely coordinated with the DFMWR, and will be done in such a way that will enhance the outdoor recreation environment. Contractors cannot be required to remove limbs and tops; however, flat lopping is specified in these areas, as is the cutting of extra low stumps. Occasionally harvesting may be done in the cantonment area and will be coordinated with the appropriate activities. There, as in recreation areas, flat lopping and low stumps will be required.

4.5.6.10 Timber Marking

All timber marking will be based upon analysis and prescriptions obtained from the FMIS when it is completed. Once stands are selected in the office for possible harvest they will be revisited and a final determination made.

Training

All personnel engaged in timber marking at Fort Gordon, as a minimum must meet the qualifications established by the Office of Personnel Management (OPM) for Forestry Technician (Government Staff [GS] 462-05). Additional training will be given as to local requirements and procedures. This training will be under actual field conditions in a productive capacity.

Field procedure

Forestry technicians or foresters will do the actual marking. Each marker will keep an individual tally records for each stand in which they mark.

- *Marking.* Normally trees to be harvested will be marked with yellow or blue tree marking paint. In a given stand, all trees will be marked on essentially the same side to maintain control of area coverage and to facilitate showing of sale, logging, and inspection. Trees tallied as pulpwood will receive one spot at or above DBH and another at the junction of the bole and the ground. Trees tallied as sawtimber will receive two spots at or above DBH and one at the ground line. In clear-cut areas where the individual trees will not be marked, a boundary will be painted around the outside of the area, preferably on trees outside of the cutting area, with a vertical paint stripe and one at ground line. Marks will be made so that they may be seen from within the harvest area. When trees such as seed trees or leave trees are to be marked to prevent cutting, marks will be made around the bole at or above DBH so as to be visible from 360 degrees and at the ground line. Seed or leave trees will be marked with a color distinguishable from all other colors used in the sale.
- *Tree tally*. Tree tally by species or species groups, products, DBH, and height class will be maintained for each stand. Specifications for forest products commonly harvested on Fort Gordon are provided in Table 4-17. Trees normally will be tallied as follows:
    - Diameter classes. Diameters of trees tallied will be measured at DBH and placed in DBH classes by product in accordance with the specifications listed below. DBH is taken at 4.5 feet above the ground line. Trees on extreme slopes will have DBH measured from the average ground line. Trees with forked boles above DBH will be counted as one tree. Trees with forked boles below DBH will be counted as two trees and DBH will be measured at 4.5 ft from the juncture of the fork. Tree with cankers or other abnormalities at DBH will be measured at the first unaffected point above and below DBH and the average of these two measurements will be used as the DBH.

- Product classes. Tally procedures for each product class follow. These procedures will be followed when marking stands for harvest.

Pine pulpwood. Pine pulpwood trees, 100 percent stem count, by 2 inch DBH class, starting with the 6-inch DBH class, will have every 10th tree recorded by DBH class and height class (short, medium, or tall). Minimum height is two, 5.56-foot logs with a minimum top diameter inside bark (DIB) of 4 inches. All pulpwood trees larger than a 20-inch class will be recorded in the 20-inch DBH class.

Pine Chip-N-Saw. Pine chip-n-saw trees in 10-inch and 12-inch DBH classes will have every 10th tree in each DBH class recorded by DBH class and height class (medium or tall). This gives a 100 percent stem count by DBH class and a 10 percent height sample by DBH class.

Pine sawtimber. Pine sawtimber trees by 2-inch class, starting with 14-inch DBH class, will have every 10th tree in each DBH class recorded by DBH class and log height. This gives a 100 percent stem count by DBH class and a 10 percent height sample by DBH class. All trees in the 18-inch DBH class and above will be 100 percent tallied by DBH class and height. Log heights will be recorded by whole and half log lengths. Minimum height is one 16-foot log with a top DIB of 9 inches.

Hardwood pulpwood. Hardwood pulpwood tally starts with 6-inch DBH class and proceeds as for pine pulpwood.

Hardwood sawtimber. Hardwood sawtimber tally starts with 12-inch DBH class and proceeds as for pine sawtimber, with all trees 20-inch DBH class and above 100 percent tallied.

Table 4-17. Forest Product Specifications

Product	Minimum DBH (inches)	Maximum DBH (inches)	Minimum Log Length (feet)	Minimum Top DIB (inches)
Pulpwood – Pine	5	40	20	3
Pulpwood – Hardwood	6	40	20	4
Chip-n-Saw – Pine	9	13	24	6
Sawtimber – Pine	13	40	16	8
Sawtimber – Hardwood	12	40	16	10
Pre-harvestable – Pine	3	5	16	0
Cull – Pine	5	40	16	0

Source: Fort Gordon, 2008c

- *Volume calculation*. All timber volumes will be calculated using appropriate computer software. A hardcopy of volume and stock/stand tables will be included with the timber availability and a copy retained in forestry office files. Stand data records will also be updated with the volumes as marked and sold.

4.5.7 Timber Cruising

Timber volume sampling, or cruising, will be used to determine volumes to be harvested from large clear-cut areas, such as areas to be cleared for ranges or construction projects. Area boundary will be paint marked, and cruise lines laid out on a map or aerial photograph to run perpendicular to any drainage.

4.5.7.1 Variable Plot Radius Cruise (or Point Sampling)

This is the most efficient means of cruising timber in the relatively level areas of this region. On Fort Gordon, a 10 factor corrected prism will be used to determine the in trees for tally. Both DBH class and merchantable height will be recorded. The number of points to be taken will be derived from the formula: {(Area of the Tract in Acres x percent of Cruise)/(BA of Average Tree)} x BAF of the prism = Number of Points Needed. Normally, cruising will be based upon a 10 percent intensity. Point sampling does not lend itself well to sparse stands.

4.5.7.2 Fixed Radius Plot Sampling

If the fixed radius plot method is used, plots will either be 0.2 acre, with a radius of 52 ft, 7.9 inches or 0.1 acre, with a radius of 37 ft, 2.8 inches. The number of plots, and spacing between plots and lines will be determined by cruise intensity, which is normally 10 percent and the number of acres to be cruised.

4.5.7.3 Cruise Volume Calculations

The appropriate automatic data processing software will be used to calculate cruise volumes.

4.5.8 Pinestraw Management

Longleaf pine needles, baled and sold as pinestraw for mulch, are a valuable product. A well-stocked stand harvested every third year can produce 50 to 150 bales of pinestraw per acre. The quality of the pinestraw available for harvest is dependant upon the percentage of longleaf pine in the stand, the amount of vegetative debris mixed in the litter, and current market conditions. Besides

producing an income, the raking of pinestraw reduces the fire hazard. High quality pinestraw stands are usually free of undesirable hardwoods, which also make them desirable as RCW habitat. Sufficient pinestraw will be left in the RCW HMU to allow for effective burning and to maintain soils and herbaceous vegetation.

Pinestraw sales are timed to coincide with the periods when the pinestraw market is good. The best period is mid-January through May. The next-best period is from the end of August through October. A number of factors are considered in scheduling areas for pinestraw harvest. Stands requiring thinning or prescribed burning should be scheduled to allow for pinestraw harvest before being cut or burned. Pinestraw harvesting in training areas and areas adjoining ranges will be coordinated with DPTMS, Range Control Branch and Directorate of Public Safety (DPS), Game Warden Section to accommodate military training, hunting, and pinestraw harvesting.

Pinestraw will not be raked more than once every 3 years. Machine raking is not authorized. Pinestraw may be baled by mechanical baler or a hand operated baling box.

Forest product sales contracts will advise contractors of the following additional conditions and restrictions within the RCW HMU:

- Raking or baling will not be permitted within active clusters during the RCW nesting season, occurring from 1 April to 31 July. Harvesting will be permitted in inactive cluster sites year-round. Inactive cluster sites will be determined by the DPWL wildlife biologist before sale;
- Parking equipment or vehicular traffic to harvest pinestraw in active RCW clusters will not be permitted. The only exception will be brief, infrequent trips into an active cluster outside the nesting season to collect piled straw or bales. These trips will only be permitted from two hours after sunrise until two hours before sunset. Vehicular traffic will be minimized in inactive cluster sites;
- Require harvest operations to move as quickly as possible through cluster sites;
- No pinestraw, including bales, will be piled or stacked against cavity trees; and

- Cutting down or intentionally damaging pine trees is prohibited unless prior permission is obtained from the installation or USACE forester. Damage to seedlings will be minimized.

4.5.9 Reimbursable Forest Products Harvesting

Currently, the only reimbursable forest products harvested on the installation consist of standing timber and pinestraw.

4.5.9.1 Reports of Availability

The annual installation General Declaration of Availability (GDOA) for timber to be harvested during the next FY is submitted in memorandum form to the USACE, Savannah District by 1 May of the current FY. The memorandum will include the total anticipated volumes to be made available for harvest in the up-coming FY. As specific areas or volume increments are marked for harvest, they will be made available individually to the USACE, Savannah District Office. Individual declarations of availabilities will include the following:

- Volumes by product class;
- Location by Training Area;
- Size in acres;
- Marking color scheme;
- Method by which volumes were obtained;
- Metal contamination declaration;
- Known endangered species and/or protected cultural resource sites in/adjacent to harvest areas;
- Requirement that Georgia's BMPs for Forestry be followed;
- Hazardous materials/waste control and spill requirements; and
- Any other harvest area specific requirements.

4.5.9.2 Inspection of On-going Harvesting Operations

All on-going harvesting operations will be inspected by both installation and District Engineer forestry personnel. Frequency of inspection will be governed by location of sale, type of cut, and knowledge of the producer's past performance and integrity. More inspections will be done on new producers than on those with a good record of performance. For each inspection made, an inspection report form will be completed (original and one copy), with the copy sent to the USACE Project Forester, and the original retained in the Forestry contract file. All deficiencies will be noted. In cases of major deficiencies noted, the installation forester may

request immediate corrective action be taken by the producer, rather than waiting for District Engineer personnel. Such action must be reported to the District Engineer Project Forester to avoid conflict or confusion. In the event that critical violations are found, such as extensive cutting of unmarked trees, cutting outside of sale area, environmental violations, or similar serious problems, the installation forester reserves the right to order all harvesting stopped. The installation forester may order the violator to leave the installation until the problem is resolved with the contractor. This action must be applied with extreme discretion. It must be reported the same day to the District Engineer Project Forester, the USACE District Forester in Savannah, and the office of the contractor or timber dealer, stating circumstances and reason for the cease and evict action. A joint survey of the violation will be made, with appropriate penalty applied by the District Engineer Sales Officer.

4.5.9.3 Contract Clearance

Upon completion of all harvesting, the District Engineer Project Forester will request a final inspection and clearance in writing. The installation Forester will take appropriate action and respond in writing as in the appended sample. Effective management of sales inspections dictates that they should be kept up to date, so that when the District Engineer personnel notify installation personnel just before completion, final inspection becomes a routine matter. This precludes a contractor leaving post before correction of any deficiencies, and materially expedites performance bond release.

4.5.9.4 Harvesting and Income Reports

The Savannah District sends a monthly printout to the installation Forester. This report shows income for the most recent month and the total to date for the FY, as well as volumes harvested by product for each contract item. A summary report is issued at the end of each FY.

4.5.9.5 Pinestraw Harvesting

The same procedures set forth in 4.5.6.9 above for standing timber harvests plus the additional requirements in 4.5.8 will be followed for pinestraw harvests. It is currently more economical to handle these sales as lump sum sales instead of unit price sales.

4.5.9.6 Personal-use Firewood and Pinestraw Harvest

Sale of firewood and pinestraw to individuals is accomplished in accordance with USASC&FG Regulation 420-3.

4.5.9.7 Timber Harvested for Installation-use

Fort Gordon is in a zone of intensive termite activity and accelerated rot of untreated wood. Therefore, there is virtually no demand for local use timber. Annually, minor use is made of standing trees for demolition training by units attached to the installation, visiting units and reserve components. Such planned use is coordinated in advance with the Forestry Section, and insofar as possible is confined to impact area fringes and areas of accessible known metal contaminated timber. A standing tree felled by demolitions is seldom usable for any further purpose.

4.5.9.8 Other Forest Products

No commercial outlet currently exists for other than standing timber and pinestraw. Efforts will be made in conjunction with the District Engineer to explore potential markets for other forest products such as fence posts and fuel wood chips to take advantage of trees that may not otherwise provide any economic return.

4.5.10 Other Silvicultural Treatments

4.5.10.1 Prescribed Fire

Prescribed fire used for RCW habitat management

Prescribed fire is one of the most important silvicultural tools available for use by forest managers in the management of the installation's woodlands. The IWFMP in Section 4.15 contains detailed management information and requirements for the use of prescribed fire and wildfire suppression on the installation. If used carefully under the proper weather conditions, prescribed fire can accomplish several silvicultural objectives. Prescribed fire can control undesirable hardwood brush, reducing competition for desirable trees, and improving habitat for the RCW. Fire dependant ecosystems such as the longleaf pine/wiregrass ecosystem and many of the plants

and vertebrates associated with them require the regular occurrence of fire in the system to thrive. The prudent use of fire under prescribed conditions can simulate natural fire without detrimentally harming the resource. Forest plant diseases such as brown spot disease, which retards the growth of longleaf pine reproduction, can be controlled by burning the outer needles of young diseased trees. Compact needle growth and pubescence around the terminal bud makes this a very fire-resistant species, which in the seedling stage, easily recovers from prescribed burning. Other silvicultural benefits include seedbed preparation for natural regeneration, the reduction of heavy fuel accumulation that could result in severe damage by wildfires, and the clearing of debris and undesirable vegetation from reforestation sites.

4.5.10.2 Species Conversions

This paragraph deals with the conversion of sites from hardwood species to pine species and from pine species to hardwood species. The conversion or restoration of non-native or off-site pine stands to native pine stands is covered elsewhere in the plan. Due to the high cost for site preparation and for tree planting, it is no longer a sound investment to convert low-yield natural scrub oak areas to pine for no other reason than the appearance of doing something. This is obvious in certain stands, which were planted on poor sites in the 1970s. These trees are 25 to 30 years old, and many of them are less than 4-inches at DBH and 25 feet in total height. It is quite possible that these stands will never reach merchantable size. At the other end of the spectrum are stands planted on better sites which received their first thinning at age 13, have received a second pulpwood thinning, and are now producing small sawtimber size stems over the entire stand. Sites for conversion, as such, are virtually non-existent, with the exception that bottomland sites supporting good species of hardwood will be “converted” by removal of all merchantable pine stems. Where hardwoods are encroaching upon the mesic environmental zones along fertile stream terraces, these terraces will be cleared and native pine allowed to regenerate, normally by natural seeding. This is not conversion in the truest sense, but a truncation of natural plant succession. The planting phase is covered in Section 4.11.1.

4.5.10.3 Removal of Undesirable Vegetation

Undesirable vegetation includes any herbaceous or woody vegetation such as scrub oaks, broadleaf weeds, bahia grass, off-site/non-native pines, and hardwood, which may or is having harmful or detrimental effect on desirable vegetation. A fully IPM approach using mechanical, prescribe fire, chemical treatment, or various combinations of these methods will be used to control undesirable vegetation. Chemical control of vegetation is covered in the IPMP (Section 4.9). All pesticides used will be applied in accordance with the label specifications by certified pesticide applicators and in accordance with all applicable DoD, Federal, and State of Georgia laws and regulations.

Herbicide vegetation control

4.5.11 Planting

Until the forest stand inventory and prescriptions data collection and report analysis is further advanced, it is not possible to forecast with any certainty the amount of planting to be done over the next five years. As described elsewhere, a considerable portion of funding spent for planting in the past has gone for naught. The current on-going forest stand inventory and prescriptions will go a long way toward precluding a repeat of past errors.

4.5.11.1 Species to be Planted

Longleaf pine will be planted in areas of natural longleaf occurrence. Longleaf pine is the species best suited to grow in the xeric soils of the installation. Loblolly pine will be the species primarily planted on loblolly sites. Slash pine will no longer be used for forest regeneration on this installation.

4.5.11.2 Direct Seeding

Direct seeding is not currently a viable method for regenerating pines in this area. Although a small amount of success was indicated several years ago, more failure than success has been experienced at this installation. If new methods are developed

which insure acceptable success with direct seeding, consideration will be given to this method.

4.5.11.3 Age of Planting Stock

All seedlings currently used are 1/0 stock.

4.5.11.4 Time of Year and Type of Planting

Currently, all planting of bare root seedlings is done from 15 December to 15 March. Planting with in-house personnel can handle up to approximately 100 acres. When the area requiring planting exceeds in-house capabilities in any one-season planting should be accomplished by contract. Planting contracts will specify machine planting, as this is the most cost-effective means of getting the job done. Hand planting may be used on areas that do not lend themselves to machine planting. Normally the site preparation and planting are let in one contract to provide an extra cost advantage, as contract administration is much more efficient this way. The contractor doing the preparation knows that he will also be doing the planting, and therefore is prone to do a better job, and becomes familiar with the area. Hand planting of containerized seedlings may begin as early as 1 November under the proper weather conditions.

4.5.11.5 Spacing

In the last few years, seedling spacing of 6 feet by 10 feet has been used in planting. The initial stocking of seedlings per acre using this spacing is 726 trees per acre. As needs and requirements dictate, spacing of seedlings may change, but the initial planting of seedlings will not exceed an average of 726 seedlings per acre.

4.5.11.6 Sources of Planting Stock

Normally bare-root planting stock will be obtained from the GFC. In the past, contractors have been required to arrange for seedling purchase and pickup as part of their obligation. Consideration is currently being given to the government obtaining the tree seedlings and providing them to the contractor to plant. Containerized longleaf seedlings are currently obtained from private nurseries. Seedlings produced from local seed sources are preferable, if available.

4.5.11.7 Advantages of Planting

Over many years, attempts have been made to reestablish pine through natural seeding by leaving seed trees at time of the final harvest. In nearly all cases this has failed, or at best left a very

spotty stand. This is most likely due to the poor quality and excessively dry soils prevalent on the installation. These areas are now largely grown up in brush and other undesirable vegetation. The use of prescribed fire as a means of preparing a seedbed is not a certainty. Mechanical seedbed preparation using rolling drum chopper or disk harrow has also been tried and failed. Because the planting of seedlings has been the only reliable method of reestablishment of pine stands, it will continue to be the prevailing method of reforestation especially in stands to be restored to native pines.

4.5.12 Correlation of Silviculture, Wildlife Management, and Outdoor Recreation

Paragraphs 4-3.d.(7) & (8)(a) of AR 200–1 state the following: *Practice responsible stewardship of forested lands to support the mission. Conduct programs that are compatible with mission operations and that support conservation compliance, sustainability, and natural resources stewardship.* In keeping with the above, forest management on this installation will be accomplished under a multiple-use concept; no one resource will be treated as being mutually exclusive. Since forest management practices can be very beneficial to wildlife habitat management, and conversely, very detrimental, this impact will be considered before any action. The forest stand inventory and prescriptions in coordination with installation wildlife biologists is set up to identify critical wildlife habitat, including that specifically for endangered species. Such features as old home sites supporting good mast producing oaks and hedgerows will be retained by deleting them from site preparation and other areas of adverse alteration. Generally, clear-cut and plant areas will not exceed an average of 75 acres in any one block. Large undifferentiated areas will be broken up by leaving one to two chain strips of unprepared land to create an edge effect. This will be specifically designed where possible to create travel lanes, link existing wildlife habitat or water sources, rather than creating an isolated feature. Any activity which will adversely alter the appearance and utility of outdoor recreation areas will be carefully planned to provide ultimate benefits, and will be discussed with the DFMWR and other pertinent staff elements prior to implementation. Where it is desirable, buffer strips will be left along highly visible areas and main thoroughfares to screen heavy logging and land clearing operations until stands are reestablished.

4.5.13 Management Records

4.5.13.1 Annual Work Plan and Annual Work Record

An Annual Work Plan for forest management activities will be completed and submitted into RPTS in accordance with U.S. Army Environmental Command guidance. This is normally submitted for the ensuing FY by 15 June of the current year to establish the budget requirement. An Annual Work Record for the FY will be completed following the close of the FY and submitted into RPTS by 31 December following the close of the FY. The annual work record will show work performed with associated costs and then will be maintained on permanent file at the DPWL Forestry Office. In addition, detailed management actions and prescriptions can be seen in the Annual Work Plan for forest management and will be included in Appendix S.

4.5.13.2Timber Availabilities

All timber availabilities for the current FY will be maintained in file in one folder. At the end of the current FY, they will be moved to storage with other current FY reports as described in the following sections.

4.5.13.3 Timber Sales Contracts

An active and inactive file will be maintained of all timber harvesting as permanent records. Once a harvesting contract is completed the bid sheet, harvest map, and volume data will be removed from the body of the contract and filed along with the final clearance letter. Inactive files will be filed in a chronological file by FY and kept on file at the DPWL Forestry Office. Harvest and income volumes and other pertinent data will be entered into automated data processing (ADP) format for future generation of reports. All other inspections and the rest of the body of the contract can be discarded. All information pertaining to any contract that may be disputed, require legal actions, banning producers from future harvest, or other such action shall be kept in their entirety until deemed no longer required.

4.5.13.4 Contract Inspection and Clearance Letters

These documents are to be maintained with the contract in the active file until completion of contract and then filed as described in Section 4.5.13.3.

4.5.13.5 Income and Cost Summaries

All forest management program costs and incomes will be maintained on a FY basis. This information will be entered into this management plan during the annual updates.

4.5.13.6 District Engineer Monthly Harvest Income Reports

District Engineer monthly reports will be kept for the current FY, with the final reports filed chronologically by FY for future reference.

4.5.13.7 Purchase Requests and IMPAC Card Files

All data pertaining to purchase of supplies, equipment and/or services will be maintained for the current FY and retained in files for 3 years. All data pertaining to 60-month maintenance contracts or other such long-term contracts will be kept current and maintained for 3 years after contract completion. Files for IMPAC card purchases will be maintained in accordance with DoD, U.S. Army, and Directorate of Contracting regulations and instructions. It is recommended that all purchase data significant in nature be retained for future reference as to stock number, or other critical data to facilitate future purchases of like or same items.

4.5.13.8 Personnel Records

All personnel records will be maintained in accordance with all Office of Personnel Management, DoD, U.S. Army, and Fort Gordon regulations. No portion of these records will be maintained in computer storage as may be prohibited by the privacy act of 1974. Most of the information contained in personnel records is private in nature, and will be maintained in a secure, confidential manner, and released only as may be prescribed by the Civilian Personnel Office. A copy of the current job description and employee performance standards for each employee will be maintained at the DPWL, Forestry Office.

4.5.13.9 Stand Management Information Records

All stand records will be maintained and updated at the DPWL Forestry Office. These are permanent in nature and govern all forest management activities; therefore, they will be secured against damage or loss, including disk backup and one hardcopy of each record.

4.5.14 Forest Management Personnel

The forest management organizational strength and requirements at Fort Gordon as of 1 October 2008 are presented in Section 5.5 of the Implementation Section of this INRMP.

4.5.15 Protection From Insects and Diseases

4.5.15.1 Protection from Insects

General

To date the only forest insect which poses a potential serious threat, is the southern pine beetle, a bark beetle pest that attacks pines throughout the south. Although serious outbreaks of southern pine beetles have occurred in northern Columbia and McDuffie Counties in recent years, Fort Gordon has not experienced any major outbreaks. Spot infestations of ips engraver beetles (*Ips* spp.) and black turpentine beetles (*Dendroctonus terebrans*) have and continue to occur on the installation. Ips and black turpentine beetles usually start in trees damaged by fire, lightning, or vehicles and these infestations are small and isolated. Normally in these cases, salvage harvesting is not practical and the trees are either left standing for snags to be used by wildlife or cut and piled if there is danger of further infestation of healthy trees.

Prevention and Detection

Maintenance of a healthy forest through proper management appears to be the best preventive measure. Observation of stand conditions is a routine procedure practiced by forest management personnel, with any symptoms of infestation or stand deterioration being investigated immediately as to cause, and any indicated corrective action is taken promptly.

Corrective Action

Salvage control is the most practical and economic control tactic for southern pine beetles, and will continue to be used at Fort Gordon. In merchantable stands, this consists of harvesting of all trees within the active spot, plus all trees within a 100-foot buffer strip around the active spot, with all trees to be felled inward into or toward the infested area. Smaller unmerchantable stems in this zone will be felled and lopped, and the cut area burned as soon as possible. Infestation in unmerchantable stands will be controlled by felling and lopping all infested stems plus a 40 to 50-foot buffer zone, followed by burning.

4.5.15.2 Protection to Diseases

There are no diseases of epidemic proportion currently affecting the timber species at this installation or in this area.

4.5.16 Protection Against Timber Trespass

4.5.16.1 Harvest Security

Timber sale areas are always clearly defined before sale and are shown on the ground to contractors. Load ticket system and log truck registry by the USACE Timber Harvesting Office insures proper product accountability. DPWL, Forestry Section and USACE personnel jointly spot check log trucks for compliance. Any discovered instances of timber trespass by current harvesting contractors or others is reported to the USACE Timber Harvesting Office immediately for corrective action to be taken or restitution made.

4.5.16.2 Reservation Boundary Integrity

A perimeter firebreak and access road built and maintained by the DPWL, Forestry Section as a fire protection measure serves also as a Military Police patrol road. This boundary road is accessible via 16 locked gates at established ingress and egress points. The issue of keys for these locks is controlled by the Forestry Section in accordance with principles outlined in AR 190-51 and procedures established for physical security for the installation. The boundary is posted with standard posted signs, replaced as needed by forestry or game warden personnel in conjunction with other activities. Military Police Game Wardens and forestry personnel make opportunistic observations concerning trespass along the boundary road. Joint inspections may be made by the Provost Marshal Office Physical Security Section and DPWL, Forestry Section. Any deficiencies such as breaches are corrected during normal maintenance by motor grader or bulldozer or are repaired by the base support contractor under service order.

4.5.17 Firebreak and Road System

4.5.17.1 Maps

The location of all roads, permanent firebreaks, and trails is maintained on maps in the natural resources geographic database. This database is updated as new firebreaks are built or existing ones are altered or abandoned. A set of aerial photographs covering the installation and adjacent areas is maintained on file and is updated, as new flights are available.

4.5.17.2 Maintenance

Due to limitations, not all permanent firebreaks and woodland access roads are worked annually. Those worked are concentrated in areas of intensive military training and range use. These include firebreaks in heavily used training areas, around the artillery impact area, and around high hazard ranges. Others, including 69 miles of reservation boundary firebreak, are reworked as needed or management activities occur in those areas. Approximately 400 miles of the total of approximately 610 miles are reworked annually. Firebreaks and woodland access roads are maintained and constructed following Georgia's BMPs for Forestry guidelines.

4.5.17.3 Accessibility

All roads, trails, and firebreaks throughout the reservation are passable to forestry vehicles during most of the year; occasionally excessive periods of wet weather may make a few locations impassable. A total of 67 miles of improved graded roads are maintained by the Pavements and Grounds Section. Culvert crossings are installed on firebreaks and woodland roads as required to facilitate travel.

4.5.17.4 Firebreak and Road Network Reduction

During the period covered by this plan, firebreaks and forest access roads will continue to be evaluated for their continued need. Those that are deemed unnecessary will be closed. Those that are closed will have erosion prevention measures installed. Due to high costs of complete road restoration, most closed roads will be allowed to restore naturally. If funds become available, roads to be closed in sensitive areas may be artificially restored.

4.6 VEGETATIVE MANAGEMENT

Vegetative management on Fort Gordon is accomplished through the Forest Management Plan (Section 4.5) and Land Management (Section 4.10).

4.7 MIGRATORY BIRDS MANAGEMENT

The MBTA of 1918, as amended and EO 13186 of January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds specifically protects migratory birds. The MBTA makes it illegal to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products, except as allowed by the

implementing regulations. EO 13186 requires that Federal agencies avoid or minimize the impacts of their activities on migratory birds and make efforts to protect birds and their habitat. Implementation of the INRMP will not adversely affect migratory birds at Fort Gordon. INRMP implementation benefits migratory bird species through the implementation of projects, including preservation of wetlands and migratory bird surveys. A detailed discussion on Fort Gordon's migratory bird management strategy is provided in Appendix N.

Migratory birds face serious challenges, including habitat loss, collisions with artificial structures, and environmental contaminants, resulting in species decline. Because migratory birds cross the boundaries of nations, watersheds, and ecosystems, protecting them requires a coordinated effort involving multiple jurisdictions and interests. However, the 2003 National Defense Authorization Act exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities. Military readiness activities include all training and operations of the Armed Forces that relate to combat and the adequate testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use. The MBTA also requires that the Secretaries of Defense and Interior identify ways to minimize, mitigate and monitor the take of migratory birds during military readiness activities.

4.7.1 Management Strategies

Migratory bird species known to occur at Fort Gordon are shown in Appendix F. Implementation of the following management measures will minimize, mitigate and monitor the take of migratory birds from military readiness activities at Fort Gordon.

- Continue the nest box program on Fort Gordon as discussed in Section 4.4.7.8 of the Fish and Wildlife Section.
- Implement the requirements of the MOU between USFWS and DoD to promote the conservation of migratory birds (Appendix N).
- Implement the program-wide goals and objectives of the DoD Partner In Flight program (Appendix N, www.dodpfi.org).
- Implement habitat enhancement for migratory bird species.
- Where possible, Fort Gordon will enter into conservation partnerships with Federal, state and local agencies and non-

governmental organizations to improve habitat and allow for bird research on the installation.

- Utilize the IPMP to reduce pesticide use on Fort Gordon.
- Control invasive species that compete with migratory bird species and their habitats.
- Where possible, site military readiness activities in ways to avoid or minimize impacts to migratory birds. If Fort Gordon notes clear evidence of bird take as a result of military readiness activities, Fort Gordon will document the take, evaluate these activities and where practicable, reduce or eliminate the take of migratory birds. If the take cannot be eliminated, the amount of take will be documented and, where practicable, mitigated for by other management.
- For non-military readiness activities, compliance with the MBTA is mandatory.

4.8 INVASIVE SPECIES MANAGEMENT

Guidelines for control and eradication of nonnative, noxious weeds on public and U.S. Army lands are established in the Federal Noxious Weed Act of 1974 and EO 13112. Kudzu is the most common pest plant species at Fort Gordon. The tropical soda apple (*Solanum viarum* [TSA]) is also believed to occur on Fort Gordon. Timely identification of infested areas and control of invasive plants can prevent ballooning control costs from an exponential growth curve.

Invasive fauna are also present at Fort Gordon. Pigeons, house sparrows, starling, and fire ants are the most common invasive fauna recorded at NAS Meridian. Invasive species management is included as part of the IPMP (Section 4.9.6.5).

4.9 PEST MANAGEMENT

4.9.1 Site

Discussions on the location, mission, and general physical environment of Fort Gordon are provided in Sections 2.1 and 2.2 of this INRMP.

4.9.2 Applicable Personnel

The IPMP applies to all activities and individuals working, residing, or otherwise doing business on Fort Gordon. It will be implemented to the maximum extent possible. At no time may pest management

operations be performed in a manner that will cause harm to personnel or the environment. Non-chemical control efforts will be used to the maximum extent possible before pesticides are used. The IPMP will be a working document and will be continually updated to reflect actual pest management practices. The Fort Gordon IPMP is provided as Appendix O.

4.9.3 Overview of Pest Management Plan

The IPMP for Fort Gordon describes the pest management requirements and outlines the resources necessary for surveillance and control of pests. It also describes the administrative, safety, and environmental requirements of the program. The program requires DoD and Georgia certified pesticide applicators; staffs of the DPWL Environmental Office, the Preventive Medicine Services and the Veterinary Activity, building occupants, and facility managers to monitor and control pests. Pests included in the plan are: weeds and other unwanted vegetation; termites; ticks, mosquitoes and other biting insects; vertebrate pests, such as birds, rodents, and snakes; flying and crawling insects; and spiders. These pests can interfere with the military mission, damage real property, increase maintenance costs, lower morale and expose personnel to diseases unless properly controlled. Actual pest management procedures are found in Appendices A and B of the IPMP (Appendix O).

4.9.4 Introduction

4.9.4.1 Purpose

This IPMP is the framework through which the pest management program is defined and accomplished on Fort Gordon. The plan identifies elements of the program to include health and environmental safety, pest identification, pest management, as well as pesticide storage, transportation, use, and disposal. This plan is to be used as a tool to reduce the reliance on pesticide usage, to enhance environmental protection, and to maximize the use of IPM techniques.

4.9.4.2 Authority

1. DoD Instruction 4150.7, DoD Pest Management Program, 22 April 1996.
2. AR 200-1, Pest Management, 29 October 1999.

4.9.4.3 Program Objective

This plan provides guidance and requirements for operating and maintaining an effective pest management program. IPM principles

are stressed in the plan. Adherence to the plan will help maintain compliance with pertinent laws and regulations. The IPM strategies found in Appendices A and B of the IPMP (Appendix O) will be maximized in order to comply with pesticide reduction on the installation in accordance with DoD Instruction 4150.7, DoD Pest Management Measures of Merit #2.

4.9.4.4 Integrated Pest Management (IPM)

IPM is the judicious use of both chemical and non-chemical control techniques to prevent pests from exceeding an acceptable population level or damage threshold. Emphasis is placed on minimizing environmental disruption that is caused by sole reliance on pesticide applications. IPM depends on surveillance to establish the need for control and to monitor the effectiveness of management efforts. Examples of minimum threshold limits for the application of pesticides are provided as Appendix C in the IPMP (Appendix O).

IPM Principles

The four basic principles described below are the heart of IPM and are descriptive of the philosophy used on Fort Gordon to manage pests. Specific IPM methods can be found in Appendices A and B of the IPMP (Appendix O). Additional methods can be found in Armed Forces Pest Management Board, Technical Information Memorandum No. 29, "Integrated Pest Management". While any one of these methods may solve a specific pest problem, often several methods are used concurrently, particularly if long-term control is the goal.

- Mechanical/Physical Control. This method involves the use of barriers, devices or manual labor to control pests. Examples of this type of control include: caulking or filling voids to eliminate harborage; mechanical traps or glue boards; installation of screens or other barriers to prevent pest entry into buildings; the application of heat or cold; hoeing to control weeds; and the manual removal of pests by vacuum or by hand. Many pest problems encountered on Fort Gordon can be prevented or solved by using mechanical control techniques.
- Cultural Control. Strategies in this method involve manipulating environmental conditions to suppress or eliminate pests. Examples of cultural control include: crop rotation; water management; destruction of alternate host plants; sanitation; and altering irrigation times. Elimination of food and water for pests through good sanitary practices

is the most important cultural control method employed under this plan. General cleanliness in buildings, dining facilities, break rooms, storage areas, etc., may prevent pest populations from becoming established or from increasing in size.

- Biological Control. This control strategy uses predators, parasites, or disease organisms to control pest populations. In some cases sterile adult insects may be released into the breeding population to lower reproductivity. Biological control may be effective in and of itself, but is often used in conjunction with other types of control. This type of control is by nature very pest specific, environmentally sensitive and may not be practical or available for a given pest problem. Pesticide formulations of bacteria are readily available biological control agents for management of caterpillars on plants and immature mosquitoes in aquatic breeding sites.
- Chemical Control. Chemical Control is the reduction of pest populations or prevention of pest injury by using materials (pesticides) to poison them, attract them to other devices or repel them from specific areas. The use of pesticides (insecticides, herbicides, fungicides and rodenticides) is often the most simple and effective method of control available. However, pest resistance has reduced the effectiveness of many once commonly used compounds. In recent years, the trend has been to use pesticides that are pest or site specific with little or only limited residual activity. In general, pesticides should be used only after other methods of control have been attempted or considered. Chemical control is most effective when used in combination with other methods such as mechanical or cultural controls.

IPM Outlines

IPM Outlines for pest surveillance and control are found in Appendices A and B of the IPMP (Appendix O). Each major pest or category of pests is addressed in separate outlines. New outlines are to be added to if additional pests at specific sites are encountered which require surveillance and/or control. Added outlines or changes in pesticide usage will be sent to the AEC Pest Management Consultant for review and approval. Appendix D of the IPMP provides required information for approval request of new pesticides to be included in the IPM programs (Appendix O). CAUTION: These outlines do not identify all the precautions and directions identified on product pesticide labels. Pesticide applicators must be familiar with and follow all precautions and

directions on the pesticide label of the pesticide being used. **The label is the law!**

4.9.4.5 Plan Maintenance

The Fort Gordon Installation Pest Management Coordinator (IPMC) maintains this plan. Pen and ink changes are made to the plan throughout the FY. It is reviewed and updated annually to reflect all the changes made in the pest management program during the FY. Annually by 1 October, updates of this plan will be sent to the AEC Pest Management Coordinator (PMC) for professional review and concurrence.

4.9.5 Responsibilities

Responsibilities for implementing the IPMP on Fort Gordon are provided in the IPMP in Appendix O.

4.9.6 Priority of Pest Management

Priorities of pest control operations will be in the order shown below.

4.9.6.1 Disease Vectors and Public Health Pests

These are insects or other animals that are capable of transmitting organisms that cause disease, or which may themselves cause injury to people or their animals.

<u>Mosquitoes</u>

- Mosquitoes occur in large numbers at Fort Gordon from March to October. Mosquitoes not only can reduce personnel efficiency due to the annoyance of their biting but also may serve as the source for diseases such as various types of encephalitis. Special emphasis is necessary for the potential threat of West Nile virus found in most of Georgia.
- Mosquito breeding sites (*e.g.,* artificial containers, small temporary pools of water, wetland areas) are located both on Fort Gordon as well as the surrounding adjacent properties. Mosquito control mainly consists of fogging, larvacide applications, and personal protection (*e.g.,* repellents). Mosquito control is extremely difficult due to the long flight range of many of the mosquito species found in this area.

<u>Ticks</u>

- Ticks may transmit disease organisms on Fort Gordon. Tick-borne diseases include: Lyme disease, Rocky Mountain

spotted fever, human ehrlichiosis, tularemia and southern tick associated rash illness (STARI). Rocky Mountain spotted fever is the most important tick-borne disease that occurs in Georgia. Tick paralysis can occur from bites but its occurrence is rare.

Spiders

- Brown recluse spiders (*Loxosceles recluse*) are found in Georgia. The spiders are generally active at night. During the day they rest in undisturbed, dark, sheltered areas such as under rocks, woodpiles and bark. They are frequently found in corners and crevices of buildings. The brown recluse normally bites when pressure is applied to it. Painful bites can cause restlessness and fevers. The healing of bites may take several weeks to months.
- Black widow spiders are known to occur in Georgia and frequent undisturbed places in warehouses, storage areas, fixed firing positions, and range and recreational structures. These spiders may produce painful bites as well as toxic reactions that can become severe.
- Fire ants are common on Fort Gordon. Their venomous sting may cause an allergic reaction in hypersensitive individuals and/or lead to secondary infections. Fire ants may also have a detrimental impact on endangered or threatened species.
- Envenomization from stings of bees, hornets (*Vespa spp.)*, yellow jackets (*Vespula* sp. or *Dolichovespula* sp.), and wasps may produce allergic reactions in some individuals.
- Skunks, raccoons, bat, foxes, stray cats and dogs not only can become a nuisance but they may be infected with rabies. Since these animals may be found in or under buildings, the disease potential should be recognized.
- Scorpions (*Centruroides*) may be found in and around buildings, particularly in those parts of the installation, which tend to remain dry. Like the black widow spider (*Latrodectus* sp.), they are usually encountered in undisturbed areas. They are poisonous, but stings cause few serious consequences.
- The copperhead (*Agkistrodon contortrix*), cottonmouth or water moccasin (*Agkistrodon piscivores*), coral snake (*Micrurus fulvius*), eastern diamondback (*Crotalus adamanteus*), and timber or canebreak rattlesnake (*Crotalus horridus*) are poisonous snakes found in Georgia. Although

rarely encountered, these snakes are capable of causing serious illness or death. A variety of nonpoisonous snakes are also found in the state; although non-venomous, their bites may be painful and could lead to secondary infection. Snakes from unwanted areas are captured alive and relocated to other areas away from ongoing activities. Removal and relocation of snakes found in unwanted areas (*e.g.*, under buildings) is occasionally required.

4.9.6.2 Quarantine Pests

No quarantine pests known to occur on Fort Gordon. If any quarantine pest is suspected, the Integrated Pest Management Coordinator (IPMC) should be notified. The IPMC should inform the AEC Pest Management Coordinator (PMC) and ultimately the USDA should be notified.

4.9.6.3 Pests of Real Property

- Subterranean (*Reticulitermes* sp.) and Formosan subterranean termites (*Coptotermes formosanus*) – Both termites are found in Georgia and may cause substantial damage. Structures made of materials, which contain cellulose, will be inspected annually or at a minimum of every other year for termites or termite damage.
- Ants - Carpenter ants (*Camponotus* sp.) and other wood-destroying insects may infest and damage wooden structures. In areas with high moisture, wood-destroying fungi are a potential problem.
- Birds and Bats - Birds and bats roost in warehouses, maintenance and other buildings and may damage equipment and supplies with their droppings. Birds requiring control may include the starling (*Pastor roseus)*, house sparrow (*Passer domesticus)*, barn swallow (*Hirundo rustica)*, and pigeon (*Columba* spp.).
- Squirrels - Squirrels, rats and mice are also capable of infesting and damaging structures.

4.9.6.4 Stored Food Product Pests

Food items located in dining facilities, kitchens, or in food storage facilities may become infested by stored food product pests. Most susceptible items are rotated, moved and consumed before infestations occur. The installation Veterinary Food Inspection personnel should be contacted whenever suspect food items are discovered in warehouse or distribution facilities. Infested food at

the consumer level should be considered for disposal. The most common stored food product pests include beetles, moths, and rodents.

4.9.6.5 Invasive Plants and Noxious Weeds

Executive Order 13112.

Invasive plants are introduced species that have few, if any, natural controls and spread out of control. Presidential EO 13112 signed 3 Feb 99, requires that each Federal agency shall "prevent the introduction of invasive species", "detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner", and "provide for restoration of native species and habitat conditions in ecosystems that have been invaded." It also requires agencies to "conduct research on invasive species and to develop technologies to prevent introduction and to provide for environmentally sound control of invasive species" and to "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions." The following criteria are necessary to meet and maintain these requirements:

- Comprehensive survey of the occurrence of incipient populations of alien invasive species at U.S. Army installations to be targeted for immediate eradication.
- Comprehensive survey of the occurrence of alien invasive species at U.S. Army installations with training, environmental and prevention control implications to facilitate an effective cost/benefit analysis for Army planners.
- Identify transportation and other pathways by which alien invasive species enter and exit an installation.
- Research impacts on alien invasive species of Army training site ecosystem management, to include prescribed burning and re-vegetation with native species that supports or is compatible with the U.S. Army military mission.
- Research extent of direct impact of alien invasive species such as musk thistle (*Carduus nutans*) or kudzu on military training mission and readiness and soldier health and safety.

- Development and demonstration of targeted application of pesticides such as glyphosate to alien invasive species to avoid non-target organisms and comply with both EO 13112 requiring alien invasive species control and EO 12856 reporting 50 percent reduction in pesticide usage.
- Convert information on management techniques, distribution, life histories, invasive characteristics, public education, and human health impacts of alien invasive species from the Federal Native Plant Conservation Initiative fact sheets and other sources, to the standard pest management outlines designed by U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) and used in this plan.

Invasive Species on Fort Gordon

Over 7 million acres of land throughout the southeast are infested with invasive kudzu. On Fort Gordon, it does not interfere with the installation's mission. Refer to Appendix U of the IPMP (Appendix O), which provides recommendations for controlling kudzu on Fort Gordon. The TSA is a perennial shrub that is native to Brazil and Argentina, but has become widespread in Florida and in some other parts of the southeast. In 1998, TSA was found and reported at 21 sites in Georgia. The primary means of dispersal is by the inter-state movement of livestock that have recently fed on the TSA. However, contaminated equipment, hay, seeds, composted manure, and sod may also serve as a means of dispersal. Appendix M of the IPMP contains "Chapter 40-4-22: Tropical Soda Apple Rules" which was recently drafted by the Georgia Department of Agriculture (Appendix O). All control of the TSA should be performed in accordance with Chapter 40-4-22. Mature plants of the TSA are 3 to 6 feet tall and are armed on the leaves, stems, pedicles, petioles, and calyxes with broad-based white to yellowish thorn-like prickles up to 0.75 inch long. Leaves and stems are pubescent; flowers are white with five recurved petals and white to cream-colored stamens that surround the single pistil. The TSA spreads rapidly and there is reason to believe that the plant can be found on Fort Gordon property. Contact the USDA – Animal, Plant, Health Inspection Service (APHIS) for questions concerning the presence of this invasive plant on Fort Gordon. There are other invasive plants found in Georgia, but their distribution is very limited in Georgia and not a high priority.

Georgia Invasive Weeds Committee

USDA-APHIS in Georgia is currently forming a committee with representatives from various organizations within the state of

Georgia such as the Department of Agriculture, Georgia Natural Heritage Program, the University of Georgia Cooperative Extension Service, and the Department of Transportation. By mid-year 2000, the committee will have established a management plan to deal with invasive plants in Georgia. The committee will develop policy and provide guidance for dealing with invasive plants in Georgia. The committee will potentially be able to obtain Federal funding for projects involving invasive plant species. Contact Art Miller, USDA-APHIS, at (770) 922-9894 for questions concerning invasive plant management policies or for possible representation on the committee.

Noxious Weeds

The list of Federally regulated noxious weeds can be found in Appendix N of the IPMP (Appendix O). The Federal Noxious Weed Act prohibits the interstate movement of the identified noxious weeds. The threat of introducing foreign vegetation (*i.e.* vegetative plant parts or seeds) from foreign soil via retrograde cargo, such as tactical equipment returning from a foreign country, is minimized by having all retrograde cargo cleared by the USDA, APHIS prior to arriving at Fort Gordon.

Ecosystem Management

The Office of the Under Secretary of Defense issued a memorandum requiring the implementation of Ecosystem management in the DoD (Memorandum, DUSD, (ES/EQ-C), 8 August 1994, subject: Implementation of Ecosystem Management in the DOD. Ecosystem management is elaborated in DoD Instruction 4715.3, and the DoD Commander's Guide to Biodiversity and Handbook for Natural Resources Managers. Special attention should be paid to prescribed burns to mimic natural burn patterns that restore the indigenous ecosystem and control noxious weeds.

Other Undesirable Vegetation

Undesirable vegetation on firing ranges, around targets, along fence lines, on road shoulders and, paved surfaces require control using appropriate herbicides. Herbicides should be applied directly to undesirable vegetation protect desirable vegetation and reduce contamination of natural resources. Some control of unwanted plants is done mechanically (mowing, string trimmers) or by using mulch materials around ornamental plants. Selective vegetation control may be required for pine planting site preparation or for pine release programs of forested areas. Prescribed burns should mimic natural mosaic pattern, intensity, periodicity, and re-

vegetation with native species that helps to control undesirable vegetation. Executive Memorandum (26 April 1996, Clinton) directs Federal executive departments and agencies to use regionally native plants for landscaping of Federal grounds and Federally funded projects. The use of native plants protects natural heritage and provides wildlife habitat. Native plant restoration may reduce the need for fertilizer, pesticides, and irrigation requirements because native plants are best suited to the local ecosystem.

4.9.6.6 Vertebrate Animal Pests

Rodents

Mice and rats occasionally invade buildings. Primary management techniques for controlling these rodents are exclusion and sanitation. Snap traps and glue boards are the main method used for controlling rodent infestations indoors. Rodenticides may be used provided they are deployed in tamper/child proof bait stations.

Forest Animals

Beaver, skunk, raccoon, squirrels and deer have periodically required control. Control efforts for beaver or other regulated wildlife species such as deer will be coordinated with the installation Natural Resource personnel, Game Warden office, and GADNR. Additional assistance may be obtained if necessary from the USDA APHIS, Wildlife Services. The local USFWS will be contacted to coordinate efforts to control Federally protected species.

- Beaver Trapping SOP

Purpose - To provide information on current population, damages caused from beavers as well as develop procedures outlining the control of nuisance beavers on Fort Gordon.

Population - Fort Gordon has a well-established beaver population. The installation has numerous drains, creeks, and lakes that provide excellent habitat for these animals. The DPWL (Fish and Wildlife and Forestry) monitors beaver populations throughout the installation.

Problems - Problems associated with beavers on Fort Gordon usually consist of flooding of timber, endangered species habitat, and roads. Other potential problems are damages caused to roadways by the clogging of pipes as well as the destruction of ornamental trees and shrubs in residential and golf course areas. The DPTMS (range control), Base Support Contractors (IAP) and others notify the DPWL (Fish and Wildlife Section) of potential

problems caused by beavers. Management decisions using IPM will be applied on a case by case basis.

Procedures - Once the Fish and Wildlife section has assessed the damage and determined the need for and type of control, the installation biologist will then proceed with selected action. Actions other than trapping (modify water control structure, fencing of trees, etc.) will be coordinated with the appropriate directorates and work order submitted to Facilities Management. If trapping is the selected action, all efforts will be coordinated through the DPTMS (Range Control), DPS (Game Wardens), and Post Safety. In residential areas, residents will be notified (verbal and written notice) of trapping efforts prior to traps being set. Also, notification will be given to directorates or contractors that may have personnel working near the trapping area.

Georgia Nuisance Animal Control Permit must be kept on file at NRB.

Fort Gordon Fish and Wildlife Section will maintain a Georgia Nuisance Animal Control Permit and will keep it on file in the biologist office (Bldg. 14600) as well as an up-to-date list of animals trapped. A report will be filed with the Georgia Special Permit Office in January, recording the previous year's trapping results. The Fish and Wildlife Section has two types of traps available for beaver control. The conibear trap is the most effective, efficient, and humanely lethal way of removing beavers. It can be positioned with the top of the trap 2 to 3 inches above the water, set in runways between dams, lodges, dens, and feeding areas on dry land. The Bailey suitcase trap is a live trap used in removing problem animals or restocking extirpated areas. Due to its lack of success in catching the animal and the high population of beavers on Fort Gordon and the surrounding areas, this trap type is seldom used.

Traps will be set and the area marked with signs ("Danger Beaver trap") and flagging tape placed on each side of the trap to identify specific sets. Traps will be checked everyday, preferably first thing in the morning, to remove beavers for disposal. Traps will not be set on or during weekends nor holidays unless approved by Chief of

Beaver Trap Site

the NRB. Traps will remain set until nuisance beavers have been removed or population control has been achieved.

Dogs and Cats

Stray dogs and cats occasionally need to be captured on Fort Gordon. Pest Control personnel from IAP World Services (IAPWS) and the Military Police are responsible for the control of stray or wild animals. Refer to Armed Forces Management Board (AFPMB) Technical Information Manual (TIM) 37, Guidelines for Reducing Feral Cat Populations for additional guidance.

Birds and Bats

Birds (non-protected species) and bats are occasional pests in and around buildings. They represent a general nuisance for building occupants and can contaminate stored materials and floors with their fecal droppings. Bird droppings can pose a health threat. Because a disinfectant should be used to neutralize the disease threat, the treated fecal dropping waste material from clean-up operations can be an environmentally sensitive issue.

4.9.6.7 Household and Nuisance Pests

Rodents, crawling insects (such as ants, cockroaches and spiders) may require control in office, billeting, food service facilities, warehouses, and other administrative buildings. Proper sanitation and physical exclusion are emphasized to discourage these pests.

4.9.6.8 Ornamental Plant and Turf Pests

Various insect pests causing damage to plants can infest trees and shrubs. Examples of these pests include the southern pine beetle, white grubs (*Phyllophaga* sp. or larvae of the family Scarabaeidae), webworms, and tent caterpillars *(Malacosoma* spp.*)*.

4.9.6.9 Other Pest Management Requirements

Pest management technicians, maintenance personnel and the military police are responsible for carcass removal. In addition, the pest management technicians may provide services for odor control in buildings and other structures. Odors may arise from dead animals, decaying vegetation, molds, fungi, or from other sources.

4.9.7 Conservation Practices for Endangered Species

4.9.7.1 Endangered Species Act

The ESA requires EPA to regulate pesticides in such a way as to protect endangered species.

Appendix O of the IPMP provides a list of Federal and state or candidate endangered or threatened species listed in Georgia (Appendix O). These lists change frequently as species are added or removed. For further information contact the Georgia Natural Heritage Program at (770) 918-6411 or the USFWS at (404) 679-7319. Refer to particular pest management outlines in Appendices A and B of the IPMP for special environmental considerations (Appendix O).

4.9.7.2 Environmental Protection Agency

EPA's endangered species pesticide program requires pesticide applicators to be aware of information not on pesticide labels about endangered species requirements. Special considerations must be taken when using pest control tactics in areas where endangered species are found.

4.9.7.3 Army Regulations

AR 200-1 requires personnel to deal with endangered and threatened species, and candidate, proposed, and state protected species as though they were endangered.

4.9.8 Health and Safety Considerations

Health and safety concerns are discussed in detail in the IPMP (Appendix O).

4.9.9 Environmental Considerations

4.9.9.1 Protection of the Public

Only certified pesticide applicators (DoD certified for government staff and Georgia certified for pest control contractor[s]) are permitted to apply pesticides on the installation. Precautions are taken during pesticide applications to protect the public on and off the installation. Pesticides will not be applied outdoors when the wind speed exceeds 10 miles per hour or less if restricted by the label. Pesticide applicators shall have a means to monitor the wind speed during outdoor pesticide applications. Whenever pesticides are applied outdoors, care is taken to make sure that any spray drift is kept away from individuals, including the applicator. Residual sprays, dusts, etc. will not be applied in the immediate area of building interiors while occupied by personnel other than pesticide applicators or other personnel wearing appropriate personal protective equipment. Building occupants are instructed not to re-enter a treated building until pesticide has dried and odors have dissipated, usually 2 hours, less if permitted by the pesticide label.

Application of non-intrusive pesticides, such as baits, is permitted in occupied buildings.

4.9.9.2 Sensitive Areas

Special consideration must be given prior to conducting pest control operations in sensitive areas that are identified on pesticide labels. No pesticides are applied directly to wetlands or water areas (ponds, lakes, streams, rivers, drainage into fish habitat, etc.) unless its use is specifically approved on the label and the proposed application is approved by the DPWL Environmental Office. In addition to aquatic habitats, sensitive areas also include critical habitat to endangered, threatened, or rare flora or fauna species, and unique geological and other natural features. Other sensitive areas include medically treatment facilities, child-development centers, playgrounds, and schools.

4.9.9.3 Endangered and Protected Species

All migratory birds (except starlings, pigeons and house sparrows) that occur on Fort Gordon property cannot be controlled without a permit. The IPMC will periodically evaluate ongoing pest control operations and will evaluate all new pest management operations to ensure compliance with the ESA and MBTA. No pest management operations are conducted that are likely to have a negative impact on endangered or protected species or their habitats without prior approval from the AEC PMC. Appendix O of the IPMP provides a list of plant and animal species that are considered to be endangered, threatened, or rare in Georgia (Appendix O).

No pest management operations are conducted in habitats that are likely to have a negative impact on endangered, threatened or protected species or their habitats without prior AEC PMC.

4.9.9.4 Pesticide Spills and Remediation

Spill cleanup materials are maintained on the installation as part of the Emergency Response Program. Whenever a pesticide is spilled, the Fire Department is notified for First Responder Level II and III support. All pesticide storage buildings and pest control vehicles are equipped with spill kits. General information relating to pesticide spills is found in AFPMB TIM 15, Pesticide Spill Prevention Management, June 1992. Specific guidance is found on the product's Material Safety Data Sheet (MSDS) and its label. All spilled pesticides are managed under the installation's Hazardous Waste Management Program and are reported to the

Environmental Office, the IPMC and the installation's Hazardous Waste Coordinator.

4.9.9.5 Pollution Prevention (P2)

This pest management program will comply, whenever possible, with EO 12856 of August 3, 1993, Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements. Controlling pests with pesticides are considered only after non-chemical control methods have been exhausted. IPM strategies that stress nonchemical control form the basic framework of this installation's pest management program. See Appendix N, for Pollution Prevention Guide for Pest Management Operations.

4.9.9.6 Prohibited Activities

1. Non-certified Pesticide Applicators are prohibited from applying pesticides.
2. At no time will a pesticide be used in any manner that is inconsistent with its label. The site of application must be identified on the pesticide label. Pesticides shall not be applied at rates higher than those specified on the label.
3. The rate of pesticide application for termite control shall not be less than those specified on the label.
4. Only those pesticides that have been approved by AEC PMC (Appendix O) shall be procured for application on the installation. No cancelled-use pesticides shall be procured.

4.9.9.7 Pesticide Approval

Only those pesticides that have been approved by the AEC PMC shall be procured for application on the installation. Prior to seeking approval of any new pesticide or technology, its usage must be evaluated in relationship to other pesticides used on the installation and to ensure adequate safety equipment is on-hand prior to receipt of the product. Procedures for obtaining approval of new pesticides are described in the IPMP (Appendix O).

4.9.9.8 Pesticide Application Equipment Calibration

The calibration for all pesticide application equipment shall be maintained current. Details concerning the calibration of pesticide application equipment are provided in Appendix O.

4.9.9.9 Disposal of Pesticide Waste Materials

The disposal of pesticide waste material is discussed in detail in the IPMP (Appendix O).

4.9.10 Pest Management Operations with Special Environmental Considerations

All pest control operations having special environmental considerations must be approved by the AEC PMC.

4.9.10.1 Use of Restricted-Use Pesticides

Restricted-use pesticides, as well as general-use pesticides, shall only be applied by certified pesticide applicators.

4.9.10.2 Potential for Contamination of Surface and Groundwater

Programmed pest control operations are not planned where the pesticide could contaminate surface and ground water via movement of pesticides off-target. The major potential for movement of pesticides off-target is via an accident involving pesticide application equipment having large capacity tanks or hoppers. The installation has the potential to treat aquatic areas for weed and algae growth using herbicides that have been EPA approved for direct application in and around aquatic sites. Also aquatic, mosquito-breeding sites may be treated with EPA approved pesticides and application techniques. The soil around and under buildings is treated for termite control using EPA approved pesticides and control techniques.

4.9.10.3 Treatment of More Than 640 Acres

No pest control procedures are programmed for areas over 640 continuous acres.

4.9.10.4 Site(s) with Endangered and Protected Species

Migratory birds, except starlings, pigeons and sparrows, are protected species. Any bird management program involving protected migratory birds will be coordinated with the USFWS and the AEC PMC. A migratory bird depredation permit must be obtained prior to conducting any bird management program involving migratory birds. Fur-bearing and game animals are protected by the GADNR laws and regulations. Management of these animals is discussed in Appendix A of the IPMP (Appendix O).

Depredation permit must be obtained.

4.9.10.5 All Aerial Application of Pesticides

No aerial applied pesticides are programmed for use on the installation. In event an aerial pesticide is considered for use, the IPMC shall complete an Aerial Validation Plan (Appendix B, AR 200-5) and submit it to the AEC PMC for approval prior to implementing aerial spray operations.

4.9.10.6 Control of Undesirable Vegetation

Management of undesirable vegetation on Fort Gordon has been discussed above in Section 4.9.6.5.

4.9.10.7 Operations Involving Experimental-Use Permits

No pest management operations are anticipated that would involve use of experimental-use pesticides.

4.9.10.8 Operations In and Around Environmentally Sensitive Areas.

No pest control operations are programmed in and around environmentally sensitive areas except as stated above.

4.10 LAND MANAGEMENT

4.10.1 Soil Erosion and Sediment Control Component

4.10.1.1 General

Excessive soil erosion and soil sedimentation reduces the capacity of land to sustain current and future mission uses. Failure to identify and prevent excessive soil erosion and soil sedimentation can jeopardize the long-term, usable life of an installation.

U.S. Army policy is that management of soils for sustainment on U.S. Army installations is accomplished by developing and implementing the soil erosion and sediment control component (SESCC) as a component of the INRMP. Fort Gordon currently operates under a number of plans, permits and programs which in conjunction form the SESCC. The stormwater permits and plans comprise the majority of the SESCC. The plans are the Phase II Municipal Stormwater Management Plan (MS4), Industrial Stormwater Pollution Prevention Plan (SWPPP), Stormwater Construction Plan and Erosion Control, Stormwater Capital Improvement Plan (CIP). The state of Georgia also protects streams with 25-foot stream buffers. The stream buffers are controlled under a state variance. Disturbance within the buffers requires a variance to be obtained from the Georgia Environmental Protection Division.

4.10.2 Soil Erosion Prevention

4.10.2.1 Soil Erosion and Sediment Control Components

The SESCC, as a component of the Fort Gordon INRMP will serve as the framework for integrated soils management to achieve sustainment of land for accomplishment of U.S. Army missions and to prevent damage to land, water resources, water quality,

equipment and facilities. The Fort Gordon DPWL, ED is responsible for the coordination and management of the SESCC.

4.10.2.2 Planning for Sustainment

Planning for development and execution of the SESCC includes establishing goals, setting objectives, involving stakeholders, characterizing the watershed (in terms of land form, soils, and slope) and its soil erosion potential, assessing the watershed (soil erosion status), describing the optimum mission landscape (current and future), describing the planning framework at various management levels (regional to site management), listing projects with resource requirements, establishing a monitoring program (including metrics), reviewing the plan annually as part of the installation's annual review of the INRMP, and as part of the formal review of the INRMP no less than every 5 years.

The SESCC program objectives provide guidance to environmental staff, planners, natural resource managers, and other stakeholders responsible for soil conservation and water quality on the military installation at Fort Gordon.

The objectives of the Fort Gordon SESCC are:

- Support the military mission by eliminating soil erosion and soil sedimentation which may cause damage to land, equipment, infrastructure, or water quality.
- Identify eroding areas and potentially erodible surfaces and prioritize projects and programs for all affected areas on Fort Gordon. Update/develop programs and projects on a yearly basis and as a part of the 5-year INRMP review.
- Implement all current plans and programs in accordance with Federal, State, and Army regulations and execute all current and future programs and projects in a manner that sustains the usable land, protects the surface water quality, minimizes costs, and does not conflict with the requirements of Fort Gordon's mission.

The SESCC is administered by DPWL. Cooperating entities include DFMWR and DPTMS. Implementation and oversight of the SESCC will be coordinated by DPWL, ED using available personnel, contractors, interagency agreements, and local installation expertise. In order to be practical and functional, this plan is intended to provide flexibility while insuring that it meets, supports, and enhances the installation's mission.

4.10.3 Plan Maintenance

The proposed planning period for the SESCC is the five-year period from Fiscal Year 2009 to 2013. All actions and activities covered by this plan will be carried out in accordance with all applicable Fort Gordon, DA, DoD, Federal, state, and local laws and regulations, specifically AR 200-1.

4.10.4 Goal and Objectives

The goal of the Fort Gordon SESCC is to maintain soil productivity as a prerequisite for ecological sustainment and mission accomplishment in perpetuity. Objectives for achieving the goal are as follows:

- Keep soil erosion within tolerance limits as defined in annual soil surveys, and restore and stabilize degraded soils.
- Keep soil from developing gullies, and stabilize and repair existing active gullies.
- Keep soil sediment in the nation's waterways within acceptable limits. The SESCC contains measurable objectives that describe the intended progress toward the goal specified in the plan. See Section 8.3.2, Monitor Soil Erosion Status, for setting measurable objectives. Projects required and necessary to achieve the objectives, are identified and prioritized in the SESCC after the completion of the first annual comprehensive erosion survey.

4.10.5 Stakeholder Involvement

The Garrison Commander (GC) and the DPWL, ED staff actively coordinate the SESCC with external stakeholders (public entities, local, state, and other federal organizations) and internal stakeholders (*e.g.*, DPTMS and other Fort Gordon directorates). Fort Gordon, DPTMS (range control staff or equivalent) will describe the optimum mission landscape requirements (current and future), including recommendations for improving the capability, availability, and accessibility of land. The DPWL, ED staff in coordination with the DPTMS staff, will ensure the SESCC optimally supports operational landscape requirements to the extent the long-term sustainability of soil is not compromised.

4.10.6 Developing Planning and Management Framework

The SESCC will use a step-down focus on issues and opportunities at various management levels or geographic scales (*i.e.*, region

and watershed, installation and sub-watershed, training area and ecological response unit, and site-specific plans and projects).

4.10.7 Annual Soil Erosion and Sedimentation Control Review

The Fort Gordon SESCC will be reviewed annually as part of the installation's annual review of the INRMP. The purpose of the review is to (1) describe the extent to which the component plan is being implemented (expected versus actual), and (2) describe any changes in management necessary based on lessons learned, unusual conditions affecting natural resource conditions, or changes in mission use of land. These annual descriptions must be appended to the SESCC and are used as an information source for the 5-year formal review.

4.10.8 Five Year SESCC Review

The Fort Gordon INRMP (and the SESCC as a component of the INRMP) must be reviewed as to operation and effect on a regular basis, but not less often than every 5 years. The purposes of the review and/or revision as necessary are as follows:

- Determine the effectiveness of the current plans relative to established goal and objectives.
- Modify the SESCC on the basis of current monitoring data and regulatory requirements.
- Identify the specific actions planned and programmed in the new SESCC and the timelines established for their execution.
- Work plan to include budget for the funds necessary to execute the actions identified in the time frames established.

4.10.9 Maintenance and Repair

4.10.9.1 Alignment of Soil-Use Capabilities

Fort Gordon will minimize soil erosion and soil sediment in water when possible, using the following methods:

- Locating physically intensive land disturbing activities on the least erodible lands. The erosion potential of a site will be analyzed using existing soil types, slopes, vegetative and the location. The erosion potential of a site and the location of adjacent wetlands and surface waters will be located on the project plans.

- Using climatic and seasonal changes in soil erosion as a factor in scheduling intensive mission operations and real property management activities to the greatest extent practical.
- Identifying and rehabilitating land disturbed by operations and real property management activities.

4.10.9.2 Monitoring Soil Erosion Status

Monitoring of soil loss is required to correlate impacts with land-use practices. Estimating soil loss is critical to defending land-use practices or finding where actual problems exist. Fort Gordon will utilize Range and Training Land Assessment (RTLA) procedures to monitor and estimate the following:

- Acres exceeding soil loss tolerances from sheet and rill erosion.
- Acres exceeding soil loss tolerances from wind erosion.
- Miles of active gullies.

RTLA monitoring of installation-wide soil erosion conditions is done every 5 years, and each major plan revision quantifies observed trends in soil erosion. The results from monitoring serve as the basis for developing measurable objectives describing the effectiveness of the previous plan and changes in management necessary to ensure the revised plan is effective. Installations with low-intensity impacts or unusually stable soils that have documented, through RTLA that excessive soil erosion is not an issue may request a wavier from Headquarters, Department of the Army, DAIM-ED, on the requirement to have an SESCC plan.

4.10.10 Land and Grounds Program Objective)

The Land and Grounds Maintenance Plan documents existing land and grounds maintenance features and provides guidance to planners, natural resources managers and other parties responsible for land and grounds maintenance on the military installation at Fort Gordon.

The objectives of the Fort Gordon's Land and Grounds Maintenance Plan are:

- to support the military mission by maintaining healthy and attractive grounds in a manner that minimizes erosion, wastes, and pollution;

- to utilize native flora and less ornamental species in landscape plans to maintain healthy and attractive grounds in a manner that enhances ecosystem integrity, minimizes costs, and does not conflict with the requirements of Fort Gordon's mission.

The land and grounds maintenance is administered jointly by the DPWL. Cooperating entities include the DFMWR and the DPTMS. Implementation and oversight of the Land and Grounds Maintenance Plan will be coordinated by DPWL using available personnel, contractors, interagency agreements, and local installation expertise as available. In order to be practical and functional, this plan is intended to provide flexibility while insuring that it meets, supports, and enhances the installation's mission.

The NRB actively works with DPWL to balance grounds maintenance needs with habitat requirements.

4.10.11 Inventory of Land Use

Land and grounds can be defined as all lands not occupied by buildings, structures, roads, or pavements. This includes all land and water acreage for which an installation has responsibility including outlying or satellite areas. There are three basic classifications of grounds: improved, semi-improved, and unimproved grounds (Figure 4-12). The acreage by Land Use classification on the installation is provided in Table 4-18.

Table 4-18. Inventory of Installation Land Use

Land Use	Area (acres)
Improved grounds	2,282.3
Semi-improved grounds	981.4
Unimproved grounds	52,863.8
Total	56,127.5

Improved grounds are those where intensive development and maintenance measures are performed. These are often developed areas of an installation such as cantonment, parade grounds, drill field, athletic areas, cemeteries, housing areas, golf courses, etc. Improved grounds typically have lawn and landscape plantings that require intensive maintenance. Semi-improved grounds are those that undergo periodic maintenance primarily for operational and aesthetic reasons (erosion and dust control, bird control, and visual clear zones). Typical semi-improved grounds include pistol and rifle ranges, ammunition storage areas, antennae facilities, picnic areas, golf course roughs, *etc.* Unimproved grounds are those not

classified as improved or semi-improved and usually are not mowed more than once a year. Typical unimproved grounds include weapons ranges, forestlands, croplands, grazing land, lakes, ponds, and wetlands.

4.10.12 Plan Maintenance

The proposed planning period for the Land and Grounds Maintenance Plan is the 5-year period from FY 2009 to FY 2013. All actions and activities covered by this plan will be carried out in accordance with all applicable Fort Gordon, U.S. Army, DoD, Federal, state, and local laws and regulations, specifically AR 200-1.

4.10.13 Existing Land and Grounds Maintenance

Fort Gordon's grounds are maintained at intensity levels necessary to meet the designated use criteria while protecting and enhancing natural resources to ensure ecosystem integrity and biodiversity. Grounds maintenance is comprised of grounds management of improved, semi-improved and unimproved grounds. Three entities are responsible for ground maintenance on Fort Gordon. Range Control under the DPTMS is responsible for range maintenance, the Detail Branch under the DPWL is responsible for Cantonment Area maintenance, and the Base Operations Contractor is responsible for the maintenance on the remainder of the installation. Areas to be mowed are determined annually and responsibilities are divided among the three responsible groups.

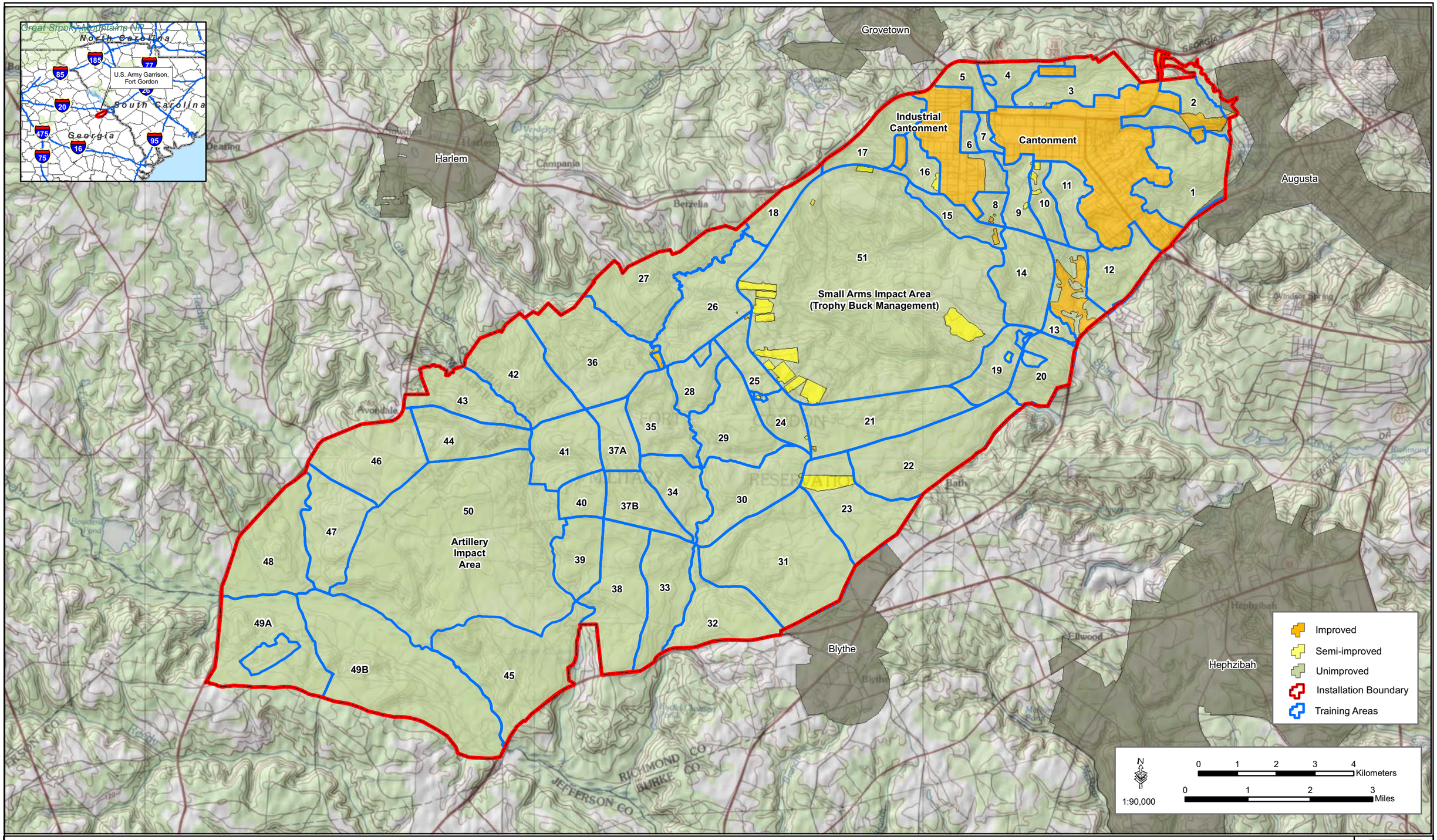

Figure 4-12: Land Classification on Fort Gordon

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All grounds within Fort Gordon are delineated as one of four maintenance level categories. The assigned maintenance level designates the performance required for the grounds maintenance practices. Maintenance Level I is specified for high visibility improved grounds; Maintenance Level II is specified for other improved grounds; Maintenance Level III is specified for semi-improved grounds; and Maintenance Level IV is specified for less prominent semi-improved grounds. Table 4-19 summarizes existing grounds maintenance for improved grounds on Fort Gordon.

Table 4-19. Existing Grounds Maintenance Summary

		POWER MOWERS		TRACTOR MOWERS		Mowing
IMPROVED GROUNDS	**Acres**	**Irrigated**	**Non-irrigated**	**Irrigated**	**Non-irrigated**	**Frequency**
Lawns mowed by DPWL	1085					2/week, 31 weeks
Athletic Fields	36					
Parade Grounds	89					
Airfields and Hospital	1					
Lawns mowed by others	963	107				
Golf courses by DPWL	None					
Golf Courses by others	140	6		77	56	1/week, 31 weeks
Road Shoulders	106 mi.					2/year
Private cemeteries	11.7	0	11.7			2/year

Semi-Improved are periodically maintained to control dust, birds and enhance aesthetics.

SEMI-IMPROVED GROUNDS	Ac	Mowed	Weed Control	Other Maintenance
Airfield and Heliports	12			Control burn
Ammunition Storage	*		As needed	
Antennae fields	0		Fence line	
Drop Zones	100			4/year
Small arms ranges	240			Control burn
Picnic areas	10			Policed
Wildlife food plots & strips	710			Disc, seed, & fertilize

Un-Improved ground are generally undeveloped areas that receive annual maintenance.

UNIMPROVED GROUNDS	Ac	Mowed	Weed Control	Other Maintenance
Ammunition Storage	*	None		
Agricultural Leases		None		
Ponds, lakes & streams	528	None	353	Fertilize/lime
Pavements	729	None		
Buildings and structures	140	None		
Non-merchantable forest lands	4827	None		Control burn
Other areas		None		

Source: USACE, 1999

Shoulders at Gates 1, 2, and 5 are included in this acreage and are mowed on a 10 day cycle. Maintenance of unimproved grounds is limited to erosion, fire control, and fertilization/liming of managed fish ponds. Currently, surface erosion on unimproved grounds is not a problem. However, areas with intense relief (such as hydrologic corridors) should be maintained with soil adhering vegetation. The Forestry Section emphasizes use of Streamside Management Zones (SMZs) in forest management. Short periods of drought during the summer months between June and September are common. Desiccated areas of brush and woodland unimproved grounds should be inspected closely during these drought periods to avoid wildfires. Forest fire management and control on installation lands is performed by the Forestry Section and is discussed in detail in Section 4.5 (Forest Management), and Section 4.15 (Wildland Fire Management) of this document. Lake and pond management are discussed in detail in Section 4.1 (Fish and Wildlife Management) of this document.

4.10.13.1 Unimproved Grounds

Fort Gordon has an estimated 52,864 acres of unimproved grounds which are comprised of 6,719 acres of general unimproved grounds and 46,145 acres of commercial forestland. General unimproved grounds at Fort Gordon consist of ammunition storage areas, agricultural leases (cropland), pavements, buildings and structures, NRFL, ponds, lakes and streams. The classification and management of Fort Gordon's forestlands are described in detail in Section 4.5 (Forestry Management) of this document. The Fort Gordon Land and Ground Maintenance Plan addresses maintenance of all other unimproved grounds.

4.10.13.2 Semi-Improved Grounds

Fort Gordon has an estimated 981 acres of semi-improved grounds consisting of airfields, heliports, ammunition storage, antenna fields, drop zones, small arms ranges, picnic areas, and wildlife food plots/strips. Maintenance of these grounds is limited to erosion control, weed control, renovation of damaged turf areas, mowing, and annual burns.

Mowing of semi-improved grounds should occur twice monthly between April and October. Surface erosion on non-airfield portions of semi-improved areas is limited and poses no significant problem. Areas with more intense relief (such as hydrologic corridors) should be maintained with soil adhering vegetation. Aeration is not needed on semi-improved grounds due to the lack of activities that create soil compaction. Should soil compaction in

semi-improved areas become a problem, aeration efforts should be conducted on an as-needed basis.

Damaged turf areas should be graded to reflect the landscape of the surrounding land, and should be reseeded within 2 days of initial report. The damaged areas should be reseeded with suitable cover with preference towards native species such as common Bermuda grass in prepared seedbeds. After seeding and initial irrigation, wheat straw or similar mulch should be applied to promote water retention. Mulch should be added to cover 75 percent of seeded area to a depth that does not inhibit seedling emergence. Jute netting or emulsified asphalt spray should be used to anchor mulch.

There are no established landscape beds on semi-improved grounds that require maintenance. In addition, there are no shrubs, hedges, or trees on installation semi-improved grounds that require regular maintenance. However, should broken limbs present safety hazards or operational problems branches should be pruned as necessary.

4.10.13.3 Improved Grounds

Fort Gordon has an estimated 2,282 acres of improved grounds consisting of athletic fields; parade grounds; post cemeteries; private cemeteries; housing and administrative area lawns; airfields and heliports; golf courses; and road shoulders. Approximately 70 percent of all maintained grounds at Fort Gordon are improved grounds that require significantly more attention than unimproved and semi-improved grounds. The following sections discuss typical maintenance performed on improved grounds.

Site Preparation

Site preparation and planting activities should occur during the early portion of the growing season between 15 March and 15 May; however, planting between 1 March and 15 June is acceptable. Sites should be accessible by conventional equipment where possible, and graded to accomplish this goal where needed. Sites should be maintained for proper drainage and erosion control. Areas where erosion has impeded seeding or other planting activities should be replenished with topsoil as necessary.

Seedbed Preparation and Seeding

Three dominant grasses are managed on Fort Gordon grounds; centipede grass (*Eremochloa ophiuroides*), Bermuda grass, and bahia grass. Bermuda grass is the dominant species and should

be used for seeding in all areas except in low-lying wetland areas adjacent to creeks and tributaries. Minimum seed specifications for hulled Bermuda grass are as follows: 48 percent pure, 0.25 percent crop, 51.7 percent inert matter, 0.05 percent weed with 85 percent germination. Although hearty, Bermuda grass requires more fertilizing than either centipede or bahia grass, but will establish itself more quickly and weather traffic and other damaging actions better than both centipede and bahia grass.

All three grasses are warm season perennials and die during the winter months. Annual ryegrass (*Lolium multiflorum*) is a winter perennial that can be seeded in the winter to add green color to landscapes. Minimum seed specifications for ryegrass are as follows: 97 percent pure, 2 percent crop, 0.33 percent inert matter, 0.06 percent weed with 90 percent germination. Lime and fertilizer should be incorporated into the soil to a depth of 3 to 4 inches with a conventional tiller or disk. Fertilizer and lime application are described in Part I (General), Section 4.6 (Requirements Performed by Contract) of this document. Preparation by hand may be necessary where slope of the land precludes mechanical tilling or disking. Debris should be removed and anomalous contours graded as needed.

The NRB provides input to grounds maintenance and landscaping programs to encourage the use of native plant species at Fort Gordon.

Common Bermuda grass seed should be used for all reseeding activities except those in wetland areas. In wetland areas, a more moisture tolerant species such as maidencane (*Panicum hemitomon*) should be used. Seeds should be cast on smooth seedbeds and disked into seedbed one to two inches deep. After casting, seedbed should be firmed with a cultipacker or similar tool. If reseeding or broadcasting is not desired, Bermuda grass stolons can be set and covered with 1 to 2 inches of soil in shallow furrows (2 to 2.5 feet apart). Any activities within wetland areas should be reviewed by ED. At that time, it would be determined if a U.S. Army permit to perform work within jurisdictional wetlands would be required.

Vegetation Replacement

Trees, shrubs, hedges, plants, and grasses on improved grounds would be replaced upon occurrence of death, irreparable damage or unsightly appearance of existing vegetation. Identical species and like numbers would be used to replace existing vegetation.

Soil Testing

Soil testing should be done before fertilizer or lime application. Soils should be analyzed for nitrogen content and pH. If soil tests are not conducted, lime should be applied at the rate of 1 ton per acre.

Fertilizing

Fertilizer should be applied to improved grounds once per year unless tests deem this unnecessary. A commercial 8-8-8 (8 percent nitrogen, 8 percent potash, 8 percent potassium) fertilizer should be used for turf, and an 8-8-8 plus zinc fertilizer should be used for flower beds, shrubs, vines, and trees. Application rates of 3 pounds of nitrogen per 1,000 square feet for turf and 0.75 pounds of nitrogen per 1,000 square feet for landscape shrubs, vines, and trees should be used in the absence of soil test results.

Aeration

Recreation areas should be aerated as needed to mitigate soil compaction caused from heavy pedestrian traffic. Particular areas that should be aerated include athletic grounds, playgrounds, and any school playgrounds. Aeration should be accomplished in a criss-cross pattern with a core-type aerator. Plugs should be crushed and distributed with soil amendments over the soil.

Soil Amendments and Mulching

Lime should be applied every 3 years at a rate of 1 ton per acre unless soil tests deem this unnecessary. Pine needles may be used as mulch around all shrubs, trees, and flowerbeds to aid in moisture retention, weed control, and aesthetics. This material should be applied and maintained at a 2- to 3-inch uniform layer over beds or around landscape plantings.

Mowing

Improved grounds should be maintained at a height of 2 inches and mowed weekly between 1 April and 30 November. In general, lawns are mowed twice weekly and athletic fields, parade grounds, post cemeteries, road shoulders, etc. are mowed once weekly. Twice weekly mowings may be required between 1 June and 1 September on improved grounds.

Edging and Trimming

Edging and trimming should be completed on all improved grounds during the same day as corresponding plots are mowed. Areas for

which edging must be completed include sidewalks, driveways, medians, and curbs. No vegetation should extend more than 1.5 inches over any noted surfaces, nor should any vegetation be cut more than 0.5 inches back from any noted surfaces.

Pruning and Clipping

Pruning of shrubs should be accomplished annually between 1 April and 30 November. Selective thinning and heading back of shrubs should be practiced to maintain original size and natural growth characteristics of the shrub. Larger trees should be pruned on a three-year cycle during the dormant season (between 1 December and 30 May) per National Arborists Association Standards. Safety clearances of 14 feet over streets, 12 feet over driveways, 8 feet over walk areas, and 4 feet from buildings and other obstructions should be maintained.

Irrigation

Irrigation of improved grounds is necessary during the growing seasons to maintain healthy turf and other landscape plantings. Portable water tanks should be used where irrigation systems are not accessible. Care should be taken to minimize runoff and ponding in low-lying areas. In the event of drought conditions, any irrigation would follow the Fort Gordon Drought Contingency Plan (Appendix P).

Undesirable Vegetation and Disease Control

A brief description of weed control measures is given in the following paragraph. Detailed information on pest and disease control at Fort Gordon is provided in the IPMP. A copy of the IPMP is maintained and can be reviewed at the ED.

Herbicide should be used in areas for which mowing does not adequately control weeds; however, herbicide may not be used as a substitute for edging or trimming. Primary application areas include airfields, fuel stations, fence lines, road signs, utility poles, and rights-of-ways. Secondary areas of application include other high visibility areas such as curbs. Acceptable herbicides include Roundup, Hyvar, 2, 4-D, Barricade, and Poast. Control of fungus on ornamentals and turf would be accomplished with Daconil and Benlate.

Pest Control

Although insects, rodents, and disease may not pose a grounds maintenance problem on Fort Gordon grounds, occasional

treatments may be necessary. Mosquitoes and German cockroaches are constant pest problems at Fort Gordon. Chemicals such as Orthene, Catalyst, PT565, Maxforce, Ficam, Gentrol, Dursban 10CR, and Scourge are applied to commonly affected areas as needed. Other common pests are controlled with Diazinon 2D, Dursban products, Brodifacoum, Roost-No-More, Cynoff, Phostoxin, Affront, Golden Malrin, Sevin, PT 515 wasp freeze, Ultraban 400, Cygon 2E, Carbamec, and Amdro.

The majority of pest control is done through contract with Johnson Controls, Inc. Government employees perform other pest control needs for golf courses and forestry. All of the pesticides used on Fort Gordon are biodegradable. Pesticides are not applied during periods of high winds, especially in occupied areas. All pesticides are applied per the manufacture's requirements. In case of over application, neutralizers will be applied if applicable.

Erosion Control

Eroded and barren areas should be mitigated with appropriate re-contouring; sloping and drainage; topsoil dressing; and reseeding or sprigging. Bare areas and all ground areas where seeding is required to prevent erosion, except improved grounds, will be properly prepared then hydro-seeded. Bare areas exceeding 0.5 square foot on improved grounds will be re-sodded with the prevalent sod. Other areas where seed will not germinate shall be sodded to establish turf. On improved grounds an annual cool season grass cover would be established and maintained during the fall and winter seasons. Cool season grasses would be replaced with perennial warm season grass at the appropriate time. Varieties of grasses to be used should be the same as the dominant surrounding warm season grass. Grassed areas damaged by vehicular traffic should be graded, seeded or sodded and irrigated as specified in TM 5-630.

Roads and firebreaks will be evaluated for closure as a part of the INRMP. The closure of unnecessary roads and firebreaks would reduce erosion on unimproved grounds. Road and firebreak closure are discussed in detail in Section 4.5.17.4 of the Forestry Management Section of this INRMP.

Recreation Area Maintenance

Recreation area maintenance is performed at all ball fields as well as outdoor recreation areas such as Sandy Run Nature Trail and Wildlife Viewing Area, Fort Gordon Recreation Area, Hilltop Riding Stables, Mirror Lake, Leitner Lake, Wilkerson Lake, and on the

installation's golf courses. Maintenance of all ball fields should be completed on Mondays by 1200 hours. If a second mowing is required, it should be performed on Thursdays before 1200 hours. Application of fertilizer, lime, herbicide, or pesticides in recreation areas should be coordinated with DFMWR recreational staff to allow schedule adjustments and proper notification to users to avoid human contact. Golf course maintenance is not performed by DPWL but independently with golf course personnel and equipment.

Golf Course Maintenance

Gordon Lakes is an approximately 90-acre, 27-hole, golf course operated by DFMWR between TAs 12 and 13. The course is situated around Gordon Lake and Mirror Lake.

Golf course greens are mowed once every 7 days and fairways are mowed three times a week. Fertilizer, pre-emergent herbicide and post emergent herbicides are applied twice a year on both courses. Lime is applied annually according to pH test results.

Pesticides are applied to control insects, rodents, and fungi that affect turf grasses. Specific chemicals and treatments are discussed in the IMP.

4.10.14 Non-point Source Pollution

Non-point source pollution refers to water pollution from the contamination of runoff from general fertilizer, herbicide, fungicide, and pesticide application. Fort Gordon has a Pollution Prevention Plan (PPP) which is maintained at the DPWL and can be reviewed. BPMs recommended in the PPP and IPMP for the application of fertilizers, herbicides, fungicides, and pesticides should be strictly adhered to. A copy of the PPP can be reviewed at the DPWL. The potential for non-point pollution for waterways and drains within and adjacent to golf courses is a major concern. Fertilizer should be applied per manufacture's guidelines and care should be taken to use slow release fertilizers (*e.g.*, Osmocote) in areas with more intense relief or that provide direct runoff (swales).

4.10.15 Grounds Debris Disposal

A Hazardous Materials and Waste Management Plan has been prepared for Fort Gordon and gives detailed information on grounds debris removal and disposal. A copy of the Hazardous Materials and Waste Management Plan can be reviewed at the ED. Non-woody debris and trash from regular policing of improved, semi-improved, and unimproved grounds, and that collected from storm

events, should be disposed at an appropriate landfill. However, enough pine straw and branches shall be retained to provide mulch for ornamental beds and trees. Chipped branches and pine straw should be stored for later use. Ground maintenance woody debris not kept for on-site mulch should be taken to the mulch pit in TA 17 across from the ammo point.

4.10.16 Grounds Maintenance Safety

Pesticides, herbicides, and insecticides should be applied by Johnson Controls, Inc. DPWL should be contacted when treatments are needed, and application should be accomplished per the application directions for each substance. Fertilizers should be dust-free, free-flowing, and non-segregating to reduce the hazards of inhalation. Application directions should be strictly followed.

Spark arrestors must be used on motorized equipment when in operation around flammables or within 50 feet of flammable substances. Mowing times must be scheduled and approved by Range Control 1 week in advance. A maintenance supervisor may be used as a liaison between the mowing operators and airfield to avoid hazardous situations. Controlled burning activity must be coordinated with DPTMS and Fort Gordon Fire Department personnel. No burning shall be conducted within 50 feet of pump houses. Firebreaks must be constructed to control burns at all times. Wildland fire control on Fort Gordon is performed by the NRB, Forestry Section and is discussed in detail in the Section 4.15 of this document.

4.11 AGRICULTURAL OUTLEASING

Fort Gordon does not maintain an agricultural outleasing program.

4.12 GIS MANAGEMENT, DATA INTEGRATION, ACCESS, AND REPORTING

4.12.1 General

Mapping and spatial analysis are integral components of natural resources management that are fulfilled through the use of geographic information system (GIS) data and software. Data provide documentation for the location and attributes of resources while software contains the tools necessary for the management, display, and analysis of these data. A major goal of any GIS is the development of rigorous organization and accuracy standards. These standards provide for a sound base dataset needed for rigorous analysis used in managing natural resources.

The following is a glossary of GIS terms used in this discussion regarding GIS. The terms are listed in order of location within text.

- **Spatial Data Standards For Facilities, Infrastructure and Environment** (**SDSFIE)** – A broad set of GIS standards created by the U.S. Army and now being implemented throughout the DoD. To reduce duplication of efforts in its development SDSFIE uses, where available, established data standards. Data organization is simplified by using hierarchical levels (Entity Set, Entity Class, and Entity Type). Each entity, or individual feature, has attributes, some of which are controlled by entry limiters called domains.
- **Entity Set** –This is the most generalized data group and the highest level of the data hierarchy. Each Entity Set contains many Entity Classes.
- **Entity Class** – This is the second level of data organization and contains a logical grouping of geographical feature types or Entity Types.
- **Entity Type** – This is the lowest level of data organization and can be graphically depicted on maps. Entity Types contain similar cartographic features or entities. The Entity Type data element corresponds to the ARC/INFO coverage, ArcView shapefile, or ArcGIS feature class.
- **Domain** – Rules used to limit the information entered into a record (cell) of a database and is applied to a field (column). The two types of domains are list and range. Fields defined using list domains reference a list of predefined terms from which one must be selected. Fields defined using range domains are numerical and input is limited to numbers that fall within the specified range.
- **Data service** – A source of GIS data that is served to customers over the internet where it can be utilized directly by the user's computer software. An example of a common data service is Environmental Systems Research Institute's (ESRI) The Geography Network.
- **Mapping service** – A source of finished maps that are typically interactive and delivered over the internet. Mapping services can be utilized by simple web browsers and complicated GIS software. An example of a mapping service is an ArcIMS site developed by a local government to share GIS data with residence.

4.12.2 Spatial Data Standard for Facilities, Infrastructure, and Environment

The US Army has set forth a policy of GIS data standardization, quality control, and reporting in the draft document AR115-XX. This program, called SDSFIE is managed by the USACE. It defines standard data storage templates, metadata documentation requirements, and quality control procedures which result in standardized, high-quality data. The SDSFIE program uses a standard data storage template with a hierarchical file schema. The most general level, the Entity Set (*i.e.*, environmental hazards), defines 26 groups that cover the spectrum of occupational fields. Each entity set contains multiple Entity Classes (*i.e.*, environmental hazard general), which break down in to the smallest class of data, the Entity Type (*i.e.*, decontamination line). A visualization of this hierarchical format taken from ArcGIS is below in Figure 4-13. A single entity type contains an attribute table with fields (columns) that are specifically defined by name, data type, length, relative placement in the table, and the specific definition of the data it should contain. Many fields limit the data placed in them with list and range domains that reduce the chances of data entry errors such as typographic ones. List domains, used for nominal data, require that the input is chosen from a list of options and any other input is not allowed. Range domains, used for numerical data, limit the data entered to be within a specific range of numbers. These standardized structures make data development uniform between offices and across installations and provide a level of quality control inherent to the data structure.

Figure 4-13. Screenshot from ArcCatalog showing the hierarchical structure of an SDSFIE Geodatabase.

A second process to ensure data integrity and promote data sharing is the production of standardized metadata (data about data). Metadata is the documentation of all aspects of data including development methods, source and content description, contact information for parties responsible for data maintenance, and other technical descriptions. This record of data development is essential for communicating the proper use of the data so that it is not applied out of context. An example of this would be using highway data derived from broad-scale satellite imagery in combination with local street data derived from a fine-scale GPS survey. If the highway data did not include metadata, the GIS technician would not know that they were inappropriate for fine-scale mapping. SDSFIE has set minimum requirements for metadata and has developed quality assurance procedure documents that give instructions for populating these sections properly.

The third process, implemented by SDSFIE to ensure data quality, is a hierarchical quality control procedure. It specifies who is responsible for data production from initiation to final approval. Most data are produced by a GIS technician who is skilled at GIS data creation, manipulation, and management, but in general, has

no authority to choose the source data or modify any data without approval. The person who has control of choosing a data source and initiating data modification is the Subject Matter Expert (SME). The SME is located within the division responsible for the data layer and is the person who is most familiar with the physical location and attributes of the spatial features. The SME is the first person in the chain-of-approval once the data and metadata are completed. The Data Steward is the next person in line after the SME and is generally the Division or Departmental Chief supervising the SME. The duty of the Data Steward is to manage the status of all the data layers within their organization by obtaining routine feedback from their SMEs. They also provide a vehicle for SME continuity upon personnel transition.

Data is maintained locally at the Directorate level. However, periodically data must be transferred to the U.S. Army for final approval and integration with a U.S. Army enterprise database. The Installation Geospatial Information and Services Coordinator, who organizes all the Garrison GIS activities, delivers completed GIS data to the Command Level Authority, who is typically the Garrison Commander, for final approval. Finally, the data are forwarded up through regional and national levels for approval and is appended to the U.S. Army GIS database. From this database these data can be accessed online from an interactive mapping website called the Army Mapper.

4.12.3 Fort Gordon GIS Data Use and Development

The Fort Gordon Environmental Division uses GIS mapping capabilities for daily decisions as well as long term planning of natural resources management and its integration with the Army Mission. This work is driven by laws such as the NEPA, ESA, and CWA. For NEPA compliance, all impacts to Federal land from a proposed project and it alternatives must be considered before the project can be implemented. These impacts are frequently to natural resources such as endangered species, water, and timber, so detailed maps are required to assess the impacts on them. A list of SDSFIE data layers that the Environmental Division maintains and the SME positions responsible for that maintenance is provided as Appendix Q.

The branches and offices within the Environmental Division keep GIS databases of these resources including threatened and endangered plant and animal inventories, hydrograph data such as streams and wetlands, cultural resource data, and environmental compliance data. The NRB, which includes Fish and Wildlife, Forestry, and Cultural Resources, maintains numerous GIS data

layers. The Fish and Wildlife Section maintains data for hunting and fishing areas, food plots, and threatened and endangered species. The Forestry Section maintains data for forest management such as a forest stand inventory, fire breaks, and prescribed burning locations. The Cultural Resource Office maintains data such as archaeological sites and cemeteries. The Environmental Compliance Branch has developed GIS data for solid waste management, groundwater and soil remediation, hazardous waste management, stormwater pollution prevention, and air pollution emission sources. Along with these data the Environmental Division also stores ancillary data that can affect a project such as infrastructure, boundaries, and geodetic reference points. Data for the Army's training mission such as training area boundaries, live-fire ranges, and training impact areas are maintained by the ITAM office.

Analyses of these data range from creating maps for a visual spatial analysis to multi-step GIS algorithms to custom software extensions. Much of the work done with GIS is producing static maps containing standard GIS layers, but will less frequently require new data or custom statistics to be produced for project specific features. The custom extensions are usually only used to run analyses for long-term planning. One custom extension is the RCW Foraging Matrix Application. This model, which creates rule-based management recommendations within the ArcGIS environment, is particularly powerful for assisting in endangered species management when given accurate and properly formatted data. The RCW Matrix uses the RCW cavity tree points along with forest stand and understory data to determine the suitability of an area for RCW foraging habitat and gives management recommendations for improving this habitat.

All of the aforementioned types of GIS analysis require accurate, updated datasets and the ability to share current data and communicate data updates with users. Currently the Environmental Division maintains a server where finalized data, intermediate working data, and all supporting files are stored. The finalized, SDSFIE compliant data are stored on the drive root in personal geodatabases while supporting data is stored in various formats within project folders. Data are constantly being updated and developed. To communicate these updates with others, emails are sent out to a core group of GIS users.

To keep up with the increasing use and complexity of GIS data and to make it available to a wider audience, several projects are being implemented. A website is being planned to discuss the use of GIS

on Fort Gordon, to communicate local and U.S. Army GIS policies, to communicate upgrades to GIS technology and software, and to communicate data updates to local users. An enterprise GIS database will be created to streamline the dissemination and updating of data using ArcGIS Server, and will make GIS services available over a wider network. GIS software users will be able to access data from a GIS data service, while non-GIS users will be able to view the data in an interactive mapping service. All of these developments will allow GIS data to be used more efficiently within the technical user group and will also bring the benefits of GIS mapping to a wider, non-technical audience.

4.13 OUTDOOR RECREATION

4.13.1 Introduction

4.13.1.1 Program Objective

Fort Gordon supports outdoor recreation as guided by AR 200-1 and the Sikes Act. The program is compatible with national defense and security requirements and is part of multiple use management. The Commanding General, Fort Gordon, is directly responsible for operations and maintenance of Fort Gordon, including implementing and enforcement of the Outdoor Recreation Plan (ORP). This involves the cooperation of many different organizations both on Fort Gordon as well as outside agencies.

The outdoor recreation program is administered jointly by the ED at DPWL, the DFMWR, and the DPTMS. Implementation and oversight of the ORP will be coordinated by DPWL, ED and DFMWR using available personnel, contracts, interagency agreements, and local installation expertise as available. The preparation and implementation of the biological management of all species and natural resources portion of the ORP are the responsibility of the NRB. DFMWR is responsible for the movement of persons, special events, and organizational elements of outdoor recreation at Fort Gordon. ITAM will coordinate with and inform DPWL of military training requirements and objectives as it relates to the implementation of short and long-term range development plans and upcoming training activities that may affect outdoor recreation resources.

As defined in AR 200-1, outdoor recreation is a recreation program, activity, or opportunity that is dependent on the natural environment. Examples include hunting, fishing, trapping, picnicking, bird watching, off-road vehicle use, hiking, horse riding, nature education, and underdeveloped camping. Hunting and fishing are consumptive outdoor activities that are addressed in

detail in Section 4.4 (Fish and Wildlife Management) of this document. Recreation facilities normally associated with urban developments, such as playgrounds, golf courses, lodging facilities, tennis courts, and ball fields are not included in this section and are addressed in the Section 4.10 (Land Management) of this document.

The objectives of the outdoor recreation program at Fort Gordon are:

- to support the military mission by providing Fort Gordon personnel with recreational opportunities to enhance quality of life;
- to provide outdoor recreation opportunities that do not conflict with the requirements of Fort Gordon's mission;
- to promote conservation and wise use of renewable natural resources;
- to protect the natural environment; and
- to promote a healthy awareness and understanding of the natural environment.

The ORP is administered jointly by DFMWR and the DPWL. The primary responsibilities of each entity are presented in Section 5.3. Implementation and oversight of the ORP will be coordinated by DFMWR and DPWL using available personnel, contracts, interagency agreements, and local installation expertise as available. In order to be practical and functional, this plan is intended to provide flexibility while insuring that it meets, supports, and enhances the installation's mission.

4.13.1.2 Plan Maintenance

The activities described herein provide a framework to allow for suitable natural resources areas of Fort Gordon to be managed for outdoor recreational opportunities. Conservation of outdoor recreation resources will be considered in all programs, site feasibility studies, and project planning and design. The proposed planning period for the ORP is the 5-year period from FY 2009 through FY 2014. All actions and activities covered by this plan will be carried out in accordance with all applicable Fort Gordon, U.S. Army, DoD, Federal, state, and local laws and regulations, specifically AR 200-1.

4.13.2 Existing Outdoor Recreation Resources

With over 52,000 acres of commercial woodland and unimproved grounds, Fort Gordon has an abundant outdoor recreation resource

base varying from forested upland habitats to forested wetland habitats and open water resources. The following sections summarize Fort Gordon's available recreation resource supply.

4.13.2.1 Natural Resources

An important concept that Fort Gordon utilizes in management of its natural resources involves the correlation of forest management, wildlife management, and outdoor recreation. All Army natural resources management is to be accomplished under a multiple-use concept and no one resource will be treated as being mutually exclusive. Fort Gordon natural resources management relies on an ecosystem-based management philosophy. This strategy blends multiple-use needs and provides a consistent framework to managing military installations, while ensuring the integrity of the ecosystem.

Ecosystem-based management is the current management philosophy being endorsed by the DoD and other Federal agencies. "Ecosystem-based conservation is a broad approach to natural resources management that involves identifying, protecting, and restoring complete ecosystems – including the structural components and the processes they undergo – while fully incorporating social, economic, and other human concerns into planning" (Leslie *et al.*, 1996).

4.13.2.2 Water Resources

Fort Gordon's water resources are discussed in detail in Section 2.3. A description of the recreational opportunities offered by the 28 managed lakes and drainages on the installation is provided in Section 4.4 (Fish and Wildlife Management) of this document.

4.13.3 Outdoor Recreation Program

Although Fort Gordon has no formal documented ORP, the installation has and currently provides multiple-use outdoor recreation opportunities such as camping, horseback riding, picnicking, and nature education. The existing recreational opportunities utilize some of its available natural resources base. A well-developed outdoor recreation program could increase the available opportunities and allow Fort Gordon to maximize its production of quality outdoor recreation. The following sections discuss existing outdoor recreation features/areas of Fort Gordon that provide the framework for an actively managed outdoor recreation program.

4.13.3.1 Outdoor Recreation Demand

One of the first steps to develop the existing recreation features into an outdoor recreation program would be to quantify or ascertain existing and projected outdoor recreation demand. A outdoor recreation survey was conducted during the preparation of Fort Gordon's Outdoor Recreation Plan to investigate and document outdoor recreation demands of the installation's residents and guests (U.S. Army 2006). Quantifying outdoor recreation demand will assist planners to determine if existing facilities/area are adequate and diverse enough to meet user demands.

4.13.3.2 Classification of Outdoor Recreation Areas

All existing and future recreation areas should be classified as either Class I, II, or III based on their potential use(s), ecosystem sustainability, and sensitivity to damage or adverse impacts from human activities. Adopting this classification system will assist installation personnel in multiple-use management and allow the ORP and NRB to identify and better plan for future facilities.

Class I recreational areas are those areas designed for intense outdoor recreational activity such as picnicking, camping, water sports, and winter sports. Class II recreational areas are those designed for less intense recreational activities such as hiking, hunting, fishing, horseback riding, mountain climbing, and rock climbing. Class III recreational areas are those of special interest such as archaeological, botanical, ecological, geologic, historic, scenic, or zoological areas.

4.13.3.3 Existing Outdoor Recreation Areas

Fort Gordon currently has three Class I, four Class II and one Class III recreation areas. These existing outdoor recreation areas provide opportunities for camping, picnicking, water skiing, horseback riding, swimming, hiking, boating, and fishing. No designated off-road vehicle (ORV) trails or areas are located on Fort Gordon. All ORV operation is both *de facto* and *de jur* restricted to existing woods roads and firebreaks. The following sections describe Fort Gordon's existing outdoor recreation program and facilities.

<u>Pointes West Army Recreation Area (Class I Recreation Area)</u>

Pointes West Army Recreation Area (PWARA) is located 31 miles from the installation adjacent to Lake Thurmond Reservoir near Leah, Georgia. The USACE provides access to the land as a military recreation and fish and wildlife management area. Fort

Gordon's DFMWR Sports and Recreation Division operate the PWARA at Thurmond Lake.

PWARA offers several types of recreational accommodations. PWARA has six rustic 3-bedroom cottages and two deluxe rustic cottages located on Lake Thurmond. PWARA offers nine camping areas with approximately 25 sites in each area. Four areas are strictly primitive sites with only grills and picnic tables provided, two areas have electrical hookups only, and three areas are complete with water, electrical and sewage hookups.

PWARA also has several recreational activities available at the site. Over 200 picnic tables are available on a first-come, first-served basis. Swimming is permitted during the summer when the PWARA Beach is open and lifeguards are on duty. Playgrounds are located throughout the area. Jon boats, pedal boats and canoes are available for rent at PWARA. A total of 48 boat sheds and 95 covered and uncovered boat slips are available for nominal user fees on a monthly basis. The boat sheds are provided with lockable doors and are covered for protection against weather. Camping and water skiing equipment are available for daily rental. Twelve 27-ft. campers are also available for rent at PWARA. The Bartram Trail system offers several miles of trails in the area.

Tactical Advantage Sportsman's Complex (Class I Recreation Area)

Tactical Advantage Sportsman's Complex (TASC) is located on Carter Road, which intersects Range Road. An 800-meter range, two trap and skeet stations, and a 3-D archery range are also located on-site. A metal pavilion with picnic tables is located near the 800-meter range.

The TASC lodge can be enjoyed by the public. Food warming facilities, tables, chairs, restrooms, and a big screen television are located in the main room for functions. The lodge can also be rented for $50.00 an hour. Hunting and fishing licenses can be purchased at the lodge.

Freedom Park and Freedom Park Trail System (Class I & II Recreation Area)

Freedom Park consists of a gazebo, two pavilions, and benches provided for quiet reflection throughout the park. Five portable toilets are available, one of which complies with Americans with Disabilities Act standards. Lanterns, spotlight, and electrical outlets are provided in key locations inside the gazebo.

Boy Scout Troup 99 created Freedom Park Trail System in 2001 with the help of volunteer assistance from numerous Fort Gordon and Augusta area citizens. Authorized activities include hiking, biking, and running; the trail is open only during daylight hours.

Hilltop Riding Stables (Class II Recreation Area)

Fort Gordon's Hilltop Riding Stables complex consists of a lodge building, 44-horse barn, a large rodeo arena, a large quarantine barn, hay storage barn, 10 miles of riding trails on-site, and 35 acres of pastures. A total of 875 acres are available for horseback riding on privately owned horses with permit. Organized trail rides for groups are offered as well as hay rides and pony rides. The facility provides spring and summer youth horse camps, birthday parties, family fun days, riding lessons, lakeside ride-outs, hourly riding fees, horseback adventure, boarding of private horses, the ranchero program, and education classes.

Leitner Lake (Class II Recreation Area)

Leitner Lake is a 28.5-acre recreational lake. A recreation area is situated adjacent to this impoundment consisting of 14 primitive campsites, 12 campsites with water and electrical hook ups, and shower and bathroom facilities. Amenities at the Leitner Lake Campground include an archery range, basketball and volleyball courts, fishing, picnic areas, covered pavilion, boat launching, and children's playground.

There are dirt trails, mountain biking trails, and horseback riding trails in the wooded area that surrounds Leitner Lake. Game-managed hunting areas are available. Hunting and fishing licenses may be purchased at the Tactical Advantage Sportsman's lodge. Rental equipment at Leitner Lake may be rented from the Outdoor Resource Center. The covered pavilion may be rented for $50.00 a day. There are four campers available to rent.

Wilkinson Lake (Class II Recreation Area)

Wilkinson Lake is a 3.9 acre lake that provides year-round fishing. It is heavily utilized and receives a lot of fishing pressure as it is close to the cantonment area. Picnic and playground areas are located next to this lake. This dam was lost in the flood of 1990 and was repaired and the lake restocked in 1993. It has been open for fishing since 1994.

Sandy Run Nature Trail and Wildlife Viewing Area (Class III Recreation Area)

The Sandy Run Nature Trail and Wildlife Viewing Area includes a 0.5 mile handicapped-accessible trail and two-story viewing platform located along a natural beaver pond. This area is excellent for family outings and provides opportunity for wildlife/nature viewing and environmental education. The trail's location, ranging from a wetland to an adjacent upland Sand Hills region of the installation, provides a vivid ecological display of the variety of habitats present of Fort Gordon. Visitors may encounter river otter, beaver, raccoon, wood ducks, great blue herons, whitetail deer, and eastern wild turkey, as well as many species of reptiles and amphibians.

Specific Outdoor Recreation Programs and Events

The Fort Gordon Outdoor Recreation Manager plans and coordinates the following programs of the Fort Gordon Tactical Advantage Sportsman's Complex and outdoor recreation events:

- The Fort Gordon Sportsman's Club sponsors a variety of activities and events for Fort Gordon and holds monthly club meetings at the TASC Complex.
- The Fort Gordon Sportsman's Club operates a 180-meter shooting range, open every Tuesday and Thursday from 11:30 a.m. to 7:00 p.m. (11:30 a.m. – 6:00 p.m. during winter months) and on select Saturdays. The range is open for recreational shooting for pistols, rifles, black powder firearms, and zeroing weapons.
- A 3-D range is open for archery shooting. The Sportsman's Club hosts several archery tournaments at the TASC (Range 14) each year.
- Skeet and trap fields are open Tuesday and Thursday from 11:30 a.m. to 7:00 p.m. and on Saturdays from 9 a.m. to 5 p.m. for skeet and trap, and sporting clays shooting.
- They also coordinate Skeet/Trap/Sporting Clays tournaments and turkey shoots at the TASC complex.
- The Fort Gordon Sportsman's Club conducts monthly bass and crappie tournaments at Butler Reservoir. They coordinate free Kid's Fishing and Shooting Derbies and National Hunting and Fishing Day each year.

Planned Outdoor Recreation Maintenance and New Facilities

In an effort to address the outdoor recreation needs at Fort Gordon, the following developments are proposed on the installation. Detailed description of these developments can be found in the Outdoor Recreation Plan (U.S. Army 2006).

- Create accessible facilities and environments.
- Provide trail links to existing and proposed neighborhoods and recreation areas (*e.g.*, Children and Youth Services Sports Complex , Main Street Recreation Area, and Freedom Park).
- Develop distinctive signage (*e.g.*, Children and Youth Services Sports Complex and Main Street Recreation Area).
- Realign sports fields for optimum usage.
- Construct six log cabins and four four-plexes at PWARA.
- Increase additional playgrounds, picnic area, and pavilions
- Build restroom facilities.
- Upgrade existing facilities and amenities (*e.g.*, restrooms at Leitner Lake).
- Expand the utility networks.
- Provide RV camping and cottages at Leitner Lake and Mirror Lake, respectively.
- Provide a central rental facility that will store and rent all recreation equipment.

4.13.4 ADMINISTRATION

4.13.4.1 Regulations and Policy

As mandated by AR 200-1, whenever practical, U.S. Army lands with suitable natural resources are to be managed to allow for outdoor recreation opportunities. The following laws and regulations address outdoor recreation on Army lands:

- Sikes Act.
- Outdoor Recreation on Federal Lands (16 USC 4601).
- EO 11989, Use of Off-Road Vehicles (ORVs) on The Public Lands.
- DODI 4715.3, Environmental Conservation Program, 3 May 1996.

- AR 200-1, Environmental Protection and Enhancement, 28 August 2007.
- TM5-635, Outdoor Recreation and Cultural Values, February 1982.
- AR 215-2, Management and Operation of Army Morale, Welfare and Recreation Programs and Nonappropriated Fund Instrumentalities, 10 October 1990.
- USASC&FG Reg 200-2, Environmental and Natural Resources Management, 1 December 1997.
- USASC&FG Reg 420-5, Hunting, Fishing, Trapping, and Horseback Riding Regulations, 25 July 2000.
- USASC&FG Reg 420-7, Endangered Species Regulations, 4 March 2008 (Draft).

Management Responsibilities

Administrative responsibilities are discussed in detail in Section 1.4 of this INRMP.

4.13.4.2 Assistance from Other Agencies

- National Park Service - The National Park Service (NPS) has a regional office located in Atlanta, Georgia that can provide technical advice to Fort Gordon personnel for the development and management of outdoor recreation resources, particularly interpretative nature trails and hiking areas. The NPS has a varied and experienced staff of rangers, natural resource managers, archeologists, historians, interpreters, landscape architects, engineers, and planners, experienced in protecting land and legacy, conducting research, and educating the public.
- U.S. Fish and Wildlife Service - The USFWS, has a field office at Athens, Georgia that provides technical advice to Fort Gordon for the management of its natural and outdoor recreation resources, particularly endangered species. AR 200-1, Chapter 4, provides cooperative guidance to be followed by Fort Gordon with the USFWS regarding endangered species management on Army installations.
- Georgia Department of Natural Resources - The State of Georgia, functioning through the Director, GADNR, provides limited technical advice and assistance if funds are available and priority warrants. GADNR provides permit and license

information, a Register of Historic Places, and guides to hunting, fishing and camping in the state.

- The Parks, Recreation and Historic Sites Division (PRHSD) - PRHSD operates state parks and historic sites on nearly 70,000 acres of state lands in Georgia. The major facilities on these sites include lodges with restaurants and conference facilities; cabins, campsites, and interpretive trails. PRHSD actively interprets natural and cultural resources to state park and historic site guests through publications, displays, exhibits and programs given by staff. PRHSD also provides technical assistance along with state and Federal grants to local governments for the acquisition and development of public recreation areas.

4.14 BIRD AIRCRAFT STRIKE HAZARD

Fort Gordon does not maintain any active runways, therefore, this section is not applicable to this INRMP.

4.15 WILDLAND FIRE MANAGEMENT

Prescribed fires are a management tool used to reduce forest fuels that could generate a high intensity fire and destroy natural resources. Prescribed fires are also a critical management tool used to support threatened and endangered species such as the RCW as well as the gopher tortoise. Frequent prescribed fires are required by the INRMP, ESMC to protect forest resources and restore and maintain the longleaf pine/wiregrass ecosystem on Fort Gordon. Growing season (winter) fires are used to reduce midstory hardwood trees and encourage the reproduction and growth of herbaceous vegetation. Fuel reduction fires are generally conduced during the dormant season (winter) when temperatures are low and the weather is more predictable. Dormant season burns also minimizes damage to desirable vegetation. All prescribed fires are conducted in accordance with the IWFMP provided as (Appendix R).

Fort Gordon annually burns the SAIA and the AIA to reduce the fuel load and risk of wildfire resulting from training related usage of flares, tracers, and explosives. The installation annually burns approximately 15,000 acres to meet natural resources and mission requirements.

4.16 TRAINING OF NATURAL RESOURCES PERSONNEL

4.16.1 Wildland Fire Personnel Training

DoD has recently adopted the National Wildfire Coordination Group's (NWCG) Federal Wildland Fire Policy to govern all wildland fire activities carried out by DoD personnel. DoD is presently exploring the possibility of seeking membership in the NWCG. The NWCG is made up of all Federal agencies (except DoD) with wildland fire responsibilities and the National Association of State Foresters. The Federal Wildland Fire Policy requires all personnel involved in prescribed fire and/or wildfire activities meet certain training and physical qualifications. DoD is presently reviewing how it will implement this requirement. Some military installations have already implemented this requirement with most of them making it mandatory for new hires and positions and voluntary for current employees. Fort Gordon's requirements for personnel qualifications will be reviewed and the IWFMP will contain complete information on personnel qualifications.

4.16.2 Timber Marking

All personnel engaged in timber marking at Fort Gordon, at a minimum must meet the qualifications established by OPM for Forestry Technician GS 462-05. Additional training will be given as to local requirements and procedures. This training will be under actual field conditions in a productive capacity.

4.16.3 Pesticide Applicator Training

All Fort Gordon personnel who apply pesticides shall have received and maintained DoD (government staff) or Georgia (contractors) certification as pesticide applicators for the categories of pest control engaged.

4.16.3.1 Federal Personnel

Federal personnel applying any pesticide on Federal land need DoD certification in accordance with AR 200-1. Only Federal employees under hiring programs with duties as pesticide applicators can participate in the on-the-job (OTJ) training program. During this time, the new employee works under the direct supervision (see paragraph 2 below) of a certified pesticide applicator, until they are qualified (1 year OTJ experience) and satisfactorily complete the DoD Pest Management Certification Course and can work independently.

4.16.3.2 Civilian Contractors

Civilian contractors applying any pesticide on Fort Gordon property require a Georgia certification in the category or applicable sub-categories of work performed. All of the contractor's pest management staff, who apply pesticides, must be certified as pesticide applicators. Non-certified contractor employees are prohibited from applying pesticides.

4.16.3.3 Self-help Pesticides

Applicators of approved self-help pesticides need no certification if not employed as pesticide applicators. Also, occupants of family housing are permitted to apply general-use pesticides in and around their assigned quarters for their personal relief and for their family members. Application of any pesticide to neighboring residences is prohibited.

4.16.3.4 IPMC

Certification is required for the IPMC in the appropriate categories of work, which occur on the installation.

4.16.3.5 Inspectors

Individuals who evaluate the quality of work of pest control contracts (QAEs) should also be trained in the pest management category or categories of work being performed.

4.16.3.6 Supervisor

Direct supervision is defined in DoD Instruction 4150.7 as supervision that includes being at the specific location where pest management work is conducted; providing instruction and control; and maintaining a line-of-sight view of the work performed. Certain circumstances may temporarily remove the line-of-sight view of the application of pesticide from the supervisor such as topographic, vegetation, or structural constraints. Under these temporary circumstances, the supervisor shall be responsible for the actions of the pesticide applicators.

4.16.3.7 Training and Certification

Training and certification will be conducted at government expense for DoD personnel. Certified pest control personnel shall be re-certified IAW Georgia or DoD requirements as specified above. Employed pesticide applicators must be certified and the quality assurance evaluator must be trained in the following categories when appropriate. Certification and training is required when

performing pest control operations that involve restricted-use or state-limited use pesticides, to supervise other employees conducting pest control involving restricted-use or state-limited use pesticides, or to evaluate contractor performance relating to pest control within these categories:

a. Forest pest control (DoD & EPA category 2; GA 23).

b. Ornamental and turf pest control (DoD & EPA category 3; GA 24).

c. Aquatic pest control (DoD & EPA category 5; GA 26).

d. Right-of-way pest control (DoD & EPA category 6; GA 27).

e. Industrial, Institutional, Structural, and Health Related pest control (DoD & EPA category 7; GA 35 and for fumigation GA 38).

f. Public health (DoD & EPA category 8; GA 31).

g. Aerial Application (DoD & EPA category 11; GA 34) if planned to be used.

The IPMP provides clarification of the Georgia statutes that address the status of state employees who apply pesticides with respect to certification, licensing, and required categories and sub-categories (Appendix O).

4.16.4 Continuing Education and Training

Personnel who are involved in pesticide applications on a regular or seasonal basis, especially when mixing formulations is required, are encouraged to attend local pest management classes, workshops, seminars, etc. This is important in order to keep abreast of pest problems and pest management techniques, which are unique to the area surrounding the installation. This is particularly true when dealing with vegetation control since many of the herbicide labels indicate that choices in strength and application technique should be based on local conditions. The time and labor expended in this type of training is easily recouped through improved efficiency in pest management. Local pest management training may include on-site training in addition to any off site re-certification training, such as the DoD course or State re-certification requirements. Other personnel who deal directly with pest control operations, but who may not need to be certified, are also encouraged to attend local seminars to better understand pest management needs.

4.17 COASTAL/MARINE MANAGEMENT

Coastal and marine management is not applicable to Fort Gordon.

4.18 OTHER LEASES

Fort Gordon does not currently maintain any other leases related to natural resources on the installation.

5.0 IMPLEMENTATION

Over the course of its implementation, the INRMP will:

- enable Fort Gordon to make progress towards achieving a sustainable natural resources base and a realistic training environment which is embodied in the diversity of the longleaf pine ecosystem;
- establish appropriate stewardship policies that serve to protect both natural and cultural resources;
- ensure compliance with environmental laws;
- provide a continuity of direction and effort that can accommodate changes in personnel and leadership;
- promote cost-effectiveness through better planning and coordination;
- promote good public relations by demonstrating the installation's commitment to stewardship, as well as a multiple-use concept for the general public; and
- make use of innovative strategies to accomplish specific management objectives.

5.1 PLAN IMPLEMENTATION AND REVIEW

The NRB will develop annual work plans based on the requirements and funding of all program elements that comprise the INRMP. Detailed natural resources management prescriptions that drive the projects are provided in Appendix S. Actions that are tied together that will take several years to implement are color coded. For example timber harvest in FY 2008 will support RCW translocation in FY 2009 and FY 2010. Additionally, a general summary of the major actions/projects during the next 5 years and the programs they support is provided in Appendix S. The annual work plans to be developed for each FY will include a listing of projects, funding requirements, CLS supported, and manpower data to complete the action. This work plan will be used to track progress on INRMP implementation, budget expenses, request budget allotments for future months and coordinate needed manpower requirements for labor intensive projects. Each year the core government Natural Resources managers will meet as necessary to review plan implementation and discuss and necessary adjustments. There will be a minimum of two meetings per year The DPWL group will consist of representatives from Wildlife, NEPA, GIS, Forestry, and Agronomy. Additional

representatives could include the SMS team and from DPTMS the Range Control, and ITAM programs. This in-process review (IPR) will serve to prioritize projects, resolve conflicts, coordinate implementation of specific provisions of the INRMP, identify common objectives so some projects may be completed by several partners, and identify the need for plan updates. The projects listed in the annual work plan will be assessed and revised as necessary. A list of prioritized projects will be developed at the beginning of each FY and reviewed and updated each quarter for the remainder of the year. The list of prioritized projects will include a brief description of the project, a cost estimate, a timeline for completion, designation as in-house or contract, the most likely funding mechanism, and a point of contact for each project. After prioritization, those projects for which funding and other resources are available will be started in accordance with the timeline developed. Other projects that need funding will be incorporated into appropriate funding streams. Non-recurring projects or new projects that require funding will be submitted into the IMCOM annual budget submission process. For example, projects will be submitted in Spring 2009 for FY 2010 funding. Recurring projects receive funding from IMCOM and AEC based on a funding model utilizing, common levels of service, installation size, number of threatened or endangered species, and number of species at risk etc. This funding model is a new budget process under IMCOM, and is likely to undergo some revision as it is implemented.

5.2 ACHIEVING NO NET LOSS

Historically, Fort Gordon has achieved a no net loss in the capability of military lands to support the mission of the installation. Implementation of the INRMP will ensure that there is no net loss in available military lands to support Fort Gordon's mission. The Fish and Wildlife Section and the Forestry Section of the NRB of the DPWL have the primary role and responsibility for the implementation of the INRMP. The ITAM of DPTMS also is an integral participant.

The implementation of proposed projects, as described in this section and future revisions and updates of this INRMP to reflect emerging natural resources planning needs, assist Fort Gordon in achieving no net loss to the military mission. These projects focus on maintaining RCW habitat, assessing the impacts of military readiness activities on RCW populations, controlling erosion and sedimentation in stream channels, implementing ecosystem management, managing the installation's forests and providing for recreational opportunities.

To implement this plan and insure minimal impacts or conflicts with military training, frequent and close coordination between the Natural Resources Branch and the DPTMS Range Control office will be necessary. Range Control schedules and manages training land use and needs to be aware of management actions within the training areas, especially those actions that involve contractors, or workers who are not a regular part of the Fort Gordon natural resources staff. These actions will include, but are not limited to, timber harvest, pine straw raking, and plant or animal surveys. In addition, the natural resources staff needs to be aware of when and where field training is occurring so work can be adjusted around those activities when necessary. Range Control provides the NRB a list of the range and training areas scheduled for use on a regular basis to assist with work planning.

5.3 OUTSIDE ASSISTANCE

The magnitude and complexity of the management requirements are such that outside assistance is necessary. This assistance can vary, but usually takes the form of a partnership, which may include funding, facilities to work in, support such as GIS, or just an agreement on how two agencies will work with each other to achieve common goals. A partnership has been established with TNC to assist with a variety of projects including identification and mapping of vegetation communities, and implementation of monitoring protocols. A Memorandum of Understanding (MOU) with the NRCS provides expertise and contract administration on numerous soil conservation projects. Many other cooperators are involved including the USACE, the GADNR, the Georgia Environmental Protection Division, universities, contractors, and others.

5.4 FUNDING OPTIONS

5.4.1 Environmental Program Requirements

Funds for recurring natural and cultural resource programs, other than forestry, are acquired from the annual budget modeling system which provides Operations and Maintenance, Environmental Compliance and Prevention Funds (OMA/ECAP). This new system is a revision of the old budgeting process and was implemented in FY 2008. The new system is supposed to provide installations with funding based on common levels of service (CLS). The model takes into account installation size and number of personnel only. This new funding model has resulted in a large decrease in natural resources funding for Fort Gordon and if the

shortfall is not corrected it will be difficult to implement the INRMP or remain in compliance with legal requirements.

Non-recurring projects or new projects are submitted by the installation to IMCOM in the summer for review and approval of funding beginning the next calendar year. For example, projects will be submitted in the summer of 2009 for funding beginning in FY 2010.

In FY 2007, Fort Gordon received approximately 1.4 million dollars from non-forestry natural resources projects submissions, including but not limited to: salaries; threatened and endangered species management, soil conservation projects, GIS management, and pest management, etc. In FY 2008 the new funding model supplied $877,000. This represents an approximately 37 percent decrease in funding levels while at the same time management requirements continue to increase. Projected funding levels for FY 2009 are also $877,000. Budget numbers depicted in the tables (Appendix T) in this plan reflect the amount required to implement the INRMP not the amount funding models will provide.

5.4.2 Forestry Funds

Fort Gordon should on average receive $604,000 annually to fund the operation of the Forest Management Program. The P2 Forestry Reimbursable Funds are received through IMCOM. The funds are derived from proceeds of forest product sales from all Army installations. Fort Gordon plans on producing an average of $675,000 to fund the account. By law the funds can only be used for reimbursement of expenses directly related to the economic production of timber products and its harvest. Budget figure requirement for the implementation of the Forest Management Plan are provided in Table 5-1.

Table 5-1. Forest Management Plan Budget for Fiscal Years 2009 through 2013

Items	FY09 ($)	FY10 ($)	FY11 ($)	FY12 ($)	FY13 ($)	TOTAL ($)
Equipment	30,000	35,000	40,000	45,000	50,000	200,000
Fire Protection	20,000	20,000	21,000	21,000	22,000	104,000
Management	395,000	400,000	405,000	410,000	415,000	2,025,000
Access Roads	55,000	55,000	56,000	56,000	57,000	279,000
Reforestation	70,000	71,000	72,000	73,000	74,000	360,000
Support	10,000	10,000	11,000	11,000	12,000	54,000
Total Requirement	580,000	591,000	605,000	616,000	630,000	3,022,000

Source: Fort Gordon, 2008

5.4.3 Fish and Wildlife

Fish and Wildlife Conservation Funds are obtained from the sale of hunting and fishing permits. These funds are designated as Army account 21X5095. Fort Gordon permit fees for hunting, fishing, and horseback riding are presented in Table 5-2. Approximately $43,000 is obtained annually from the sale of these permits to be used for management of game and sport fish. These funds are used to plant wildlife openings; stock, fertilize, and lime fishing ponds; print hunting and fishing regulations; purchase and maintain tractors and other equipment; and other related requirements.

Table 5-2. Fort Gordon Permit Fees.

Combination hunting/fishing	Hunting	Fishing	Big game permit	Horseback Riding permit	100% Disabled hunting and fishing
$25	$15	$15	$20	$25	No charge
Guest Permits					
Daily hunting	Daily fishing	7-Day Hunting	7-Day Fishing	Daily horseback riding	Daily hunting
$10	$5	$50	$25	$5	$10

5.4.4 Other Funds

Other funds that may become available to complete projects are the DoD Forestry Reserve Account, Legacy, Agricultural Outlease, construction project mitigation funds, USDA (Pest Management Board) funds, DoD "Sustainable Forests, Protecting Our Future" funds, end of FY funds (Subject to Availability), grants, and other funding sources.

5.4.5 Summary of INRMP Implementation Costs

The average annual costs of fully implementing the INRMP are presented below by funding category. These total annual costs represent an estimate of the cost of implementation: however, some variability from year-to-year can be expected. Average annual costs are:

- Environmental (Environmental Program Requirements): $1,330,800
- Fish and Wildlife: $43,000
- Forestry: $604,000

The total average annual funding necessary to fully implement this INRMP from FY09 through FY13 is $1,977,800. The total cost over 5 years of fully implementing this INRMP is $9,895,000.

5.5 STAFFING

The proposed staffing and current Natural Resources Branch staffing requirements are presented in Table 5-3. The NRB is made up of the Forestry, Fish and Wildlife, Agronomy, GIS, NEPA, and Cultural Resources sections. While the NEPA, GIS and Cultural Resources staff supports the INRMP and its implementation, they do not directly perform natural resources management and are not included in the staffing discussion below. During the summer of 2007, Fort Gordon participated in the IMCOM Environmental Staffing Standard workshop to determine the number of staff required to properly manage the installation's resources. The data presented in the table are based on the estimated numbers of staff to complete the tasks outlined in that staffing study. The Fish and Wildlife Section has a projected government staff of four people and three contract positions addressing seven program areas: RCW; threatened and endangered species; environmental awareness; soil conservation; range and training area compliance; wetlands management; and fish and wildlife management. Currently the Fish and Wildlife Section consists of one Wildlife Biologist. The Forestry Section has a projected staff of eight personnel addressing three program areas: Timber Management; Fire Management; and Land Management Support. The current government staff of three includes the installation forester, one management forester, and one forestry technician. In addition, there is one inventory forester position that is currently filled through a support contract. Additional land management requirements to include erosion control; pest control oversight; native plant restoration; and land and ground maintenance oversight, are the responsibilities of the office agronomist.

Fort Gordon will find it necessary to hire additional sources of temporary labor to assist in the completion of some projects. These temporary hires could include support contractors, seasonal employees, university hires (interns), ORISE hires, and Student Conservation Association interns. However, the core government natural resources management professionals currently in-house provide the foundation and fulfill the supervisory roles necessary to continue the successful natural resources program at Fort Gordon.

Table 5-3. Natural Resources Branch, Environmental Division, DPWL Proposed and Current Staffing Requirements at Fort Gordon

Natural Resources Branch	Grade	Recognized	Authorized	On-Hand	Required
Branch Chief	GS-12	1	1	1	1
Forestry Section					
Forester	GS-11	1	1	1	1
Forester (Forest Management)	GS-09	1	1	1	1
Forester (Inventory) (Contractor)	GS-09	0	0	1 Contract	1
Forestry Technician (For. Mgmt.)(ORISE)	GS-07	0	0	1 ORISE	1
Forestry Technician (Fire Mgt)	GS-09	0	0	0	1
Forestry Technician (Fire Mgt)	GS-08	1	1	1	0
Forestry Technician (Fire Mgmt.) (ORISE)	GS-07	0	0	1 ORISE	1
Forester/GIS Specialist (Contractor)	GS-09	0	0	1 Contract	1
Heavy Equipment Operator	WG-8	0	0	1 Contract	1
Fish and Wildlife Section					
Wildlife Biologist	GS-11	1	1	1	1
Wildlife Biologist	GS-09	1	1	0	1
Fisheries Biologist	GS-09	0	0	0	1
Wildlife Technician	GS-07/09	0	0	2 Contract	2
Wildlife Biologist SCA/Orise position	NA	0	0	0	2
Land and Grounds Management					
Ecologist and Montioring	NA	0	0	2 Contract	2
Agronomist	GS-11	1	1	1	1
Totals		7	6	15	19

Source: Fort Gordon, 2008

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